



Aerospace Medicine  
and Biology  
A Continuing  
Bibliography  
with Indexes

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# **AEROSPACE MEDICINE AND BIOLOGY**

## **A CONTINUING BIBLIOGRAPHY WITH INDEXES**

**(Supplement 283)**

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in March 1986 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 184 reports, articles and other documents announced during March 1986 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Seven indexes -- subject, personal author, corporate source, foreign technology, contract, report number, and accession number -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1986 Supplements.

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# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 283)*

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## LIFE SCIENCES (GENERAL)

Includes genetics.

**A86-16751**

**THE EFFECT OF KALLIKREIN ON THE DEVELOPMENT OF A GENERAL ADAPTATION SYNDROME [VLIANIE KALLIKREINA NA RAZVITIE OBSHCHEGO ADAPTATIONNOGO SINDROMA]**  
IU. V. KOLENDA, S. V. VOVCHUK, and A. P. LEVITSKII (Gorodskaya Klinicheskaya Bol'nitsa No. 2, Odessa, Ukrainian SSR) *Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya* (ISSN 0031-2991), July-Aug. 1985, p. 52-54. In Russian. refs

The effect of kallikrein on the resistance of rats to immobilization stress has been investigated, experimentally. It is shown that intravenous injection of kallikrein increased the peripheral blood concentration of aldosterone, a steroid hormone regulating sodium and potassium metabolism. It is suggested that the adaptogenic effect of kallikrein may be mediated by the adrenal cortex. I.H.

**A86-16752**

**THE EFFECT OF AURICULAR ELECTRIC STIMULATION ON MYELOPEPTIDE PRODUCTION AND EARLY REACTIONS OF BLOOD SYSTEMS CELL POPULATIONS IN THE PRESENCE OF IMMOBILIZATION STRESS [VLIANIE AURIKULIARNOI ELEKTROSTIMULIATSII NA PRODUKTSIIU MIELOPEPTIDOV I RANNIE REAKTSII KLETOCHNYKH POPULIATSII SISTEMY KROVI PRI IMMOBILIZATSIONNOM STRESSE]**

A. M. VASILENKO, L. A. ZAKHAROVA, and O. I. BELOUSOVA (Tsentral'nyi Nauchno-Issledovatel'skii Institut Refleksoterapii; Institut Immunologii, Moscow, USSR) *Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya* (ISSN 0031-2991), Sept.-Oct. 1985, p. 26-30. In Russian. refs

**A86-16754**

**SOME RESULTS OF A STUDY OF THE BIOENERGETICS OF RAT MUSCLE IN WEIGHTLESSNESS [NEKOTORYE ITOGI IZUCHENIYA BIOENERGETIKI MYSHTS V NEVESOMOSTI]**

E. S. MAILIAN, E. A. KOVALENKO, and L. B. BURAVKOVA (Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1985, p. 69-73. In Russian. refs

Oxidative phosphorylation and the activity of cytochrome oxidase and lactate dehydrogenase were studied in the skeletal muscles of rats exposed to weightlessness on board three different Cosmos biosatellites. It is found that exposure to weightlessness for a period of 18-22 days was accompanied by a marked inhibition of oxidative metabolism and glycolysis in skeletal muscles having different morphofunctional specializations. Disorders of oxidative phosphorylation and reduced enzyme activity were also found. Muscular tissue was restored by the end of the first month of a readaptation period. I.H.

**A86-16783**

**THE GEROPROTECTIVE ACTIVITY OF 2,6-DIMETHYL 3,5-DIETHOXYCARBONYL 1,4-DIHYDROPYRIDINE [GEROPROTEKTORNAIA AKTIVNOST' 2,6-DIMETIL 3,5-DIETOKSIKARBONIL 1,4-DIGIDROPIRIDINA]**

L. K. OBUKHOVA, G. IA DUBUR, G. D. TIRZIT, IA. R. ULDRIKIS (AN SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR; AN LSSR, Institut Organicheskogo Sintez, Riga, Latvian SSR), and N. M. EMANUEL (Akademiya Nauk SSSR, Doklady (ISSN 0002-3264), vol. 284, no. 5, 1985, p. 1271-1274. In Russian. refs

**A86-16800**

**MODERN CONCEPTS REGARDING SOME NONTRADITIONAL NEUROENDOCRINE MECHANISMS OF STRESS [SOVREMENNYE PREDSTAVLENIA O NEKOTORYKH NETRADITSIONNYKH NEIROEN DOKRINNYKH MEKHANIZMAKH STRESSA]**

V. D. SLEPUSHKIN, IU. B. LISHMANOV, G. K. ZOLOEV, and I. A. PRUM (Vsesoiuznyi Kardiologicheskii Nauchnyi Tsentr, Tomsk, USSR) *Uspekhi Fiziologicheskikh Nauk* (ISSN 0301-1798), vol. 16, Oct.-Dec. 1985, p. 106-118. In Russian. refs

The mechanisms involved in stress reaction (SR) were studied by analyzing humoral changes that follow application of stress (in man and animals). It is shown that, besides the stimulation of the hypothalamus-hypophyseal-adrenal system (HHAS), the SR syndrome includes activation of the parathyroid (PS) and epiphyseal (ES) systems, as well as the release of opioid neuropeptides. The PS is seen to play the key role during the initial anxiety, phase (AP) of the SR, with an almost immediate increase of blood parathormone accompanied by an increase of blood Ca and, consequently, eventual activation of the HHAS. The ES activity effects the transmission from the AP to the resistance phase of the SR, by further stimulating the HHAS and intracellular cyclic AMP/cyclic GMP systems. The opioids, particularly endorphins and enkephalins, contribute to the SR as neurotransmitters. I.S.

**A86-16901\*** Maryland Univ., Baltimore.

**FIBRE-TYPE SPECIFICITY AND EFFECT OF THYROID HORMONE ON GLUCOSE 6-PHOSPHATE DEHYDROGENASE ACTIVITY IN NORMAL AND DENERVATED SKELETAL MUSCLES OF THE RAT**

S. R. MAX, E. C. B. HALL-CRAGGS, and M. CHACON (Maryland, University, Baltimore) *Histochemical Journal* (ISSN 0018-2214), vol. 17, 1985, p. 699-706. refs  
(Contract NIH-NS-15760; NIH-HD-16596; NAG2-100)

**A86-16902\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**DICYCLOHEXYLCARBODIIMIDE-SENSITIVE ATPASE IN HALOBACTERIUM SACCHAROVORUM**

H. KRISTJANSSON and L. I. HOCHSTEIN (NASA, Ames Research Center, Moffett Field, CA) *Archives of Biochemistry and Biophysics* (ISSN 0003-9861), vol. 241, Sept. 1985, p. 590-595. refs

Membranes from *Halobacterium saccharovorum* contained a cryptic ATPase which required Mg(2+) or Mn(2+) and was activated by Triton X-100. The optimal pH for ATP hydrolysis was 9-10. ATP or GTP were hydrolyzed at the same rate while ITP, CTP, and UTP were hydrolyzed at about half that rate. The products of ATP hydrolysis were ADP and phosphate. The ATPase required high concentrations (3.5 M) of NaCl for maximum activity. ADP

was a competitive inhibitor of the activity, with an apparent  $K_i$  of 50 micro-M. Dicyclohexylcarbodiimide (DCCD) inhibited ATP hydrolysis. The inhibition was marginal at the optimum pH of the enzyme. When the ATPase was preincubated with DCCD at varying pH values, but assayed at the optimal pH for activity, DCCD inhibition was observed to increase with increasing acidity of the preincubation medium. DCCD inhibition was also dependent on time of preincubation, and protein and DCCD concentrations. When preincubated at pH 6.0 for 4 h at a protein:DCCD ratio of 40 (w/w), ATPase activity was inhibited 90 percent. Author

**A86-16924\*** Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**THE ROLE OF REABSORPTION IN THE SPECTRAL DISTRIBUTION OF PHYTOPLANKTON FLUORESCENCE EMISSION**

D. J. COLLINS, I. S. MCDERMID (California Institute of Technology, Jet Propulsion Laboratory, Pasadena), D. A. KIEFER, and J. B. SOOHOO (Southern California, University, Los Angeles) *Deep-Sea Research* (ISSN 0198-0149), vol. 32, 1985, p. 983-1003. NASA-supported research. refs

A theoretical model has been developed to describe an experimentally observed spectral shift in the fluorescence emission from phytoplankton as a result of the internal reabsorption of that emission. This model accounts for both the absorption of the primary excitation and the modification of the fluorescence through the reabsorption of the emitted light by the chloroplast and by the surrounding medium. Comparisons are made between the results of the theoretical model and data derived from experiments using a number of different phytoplankton species, each adapted to varying light conditions. The details of the model are discussed, and the consequences of its interpretation on the spectral distribution of the fluorescence emission from phytoplankton are examined. Author

**A86-17467**

**BRAIN ASYMMETRY IN ANIMALS [ASIMMETRIIA MOZGA ZHIVOTNYKH]**

V. L. BIANKI Leningrad, Izdatel'stvo Nauka, 1985, 295 p. In Russian. refs

Laboratory studies on the morphological and functional lateral specialization of the large hemispheres of the animal brain are presented. Special consideration is given to aspects of individual and species-related asymmetry, the biological and environmental factors involved in its development, and the phenomenon of lateralization in the analysis of physical stimuli by the animal brain. Lateral specialization of the vertebrate brain is discussed in the framework of the induction-deduction hypothesis (Bianki, 1982 and 1983), and its role in the processes of adaptation and biological evolution is considered. I.S.

**A86-17607\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**AMES RESEARCH CENTER LIFE SCIENCES PAYLOAD - OVERVIEW OF RESULTS OF A SPACEFLIGHT OF 24 RATS AND 2 MONKEYS**

P. X. CALLAHAN, C. SCHATTE, R. E. GRINDELAND, G. BOWMAN (NASA, Ames Research Center, Moffett Field, CA), W. A. LENCKI (GE Management and Technical Services Co., Moffett Field, CA) et al. AIAA, Shuttle Environment and Operations Conference, 2nd, Houston, TX, Nov. 13-15, 1985. 11 p. (AIAA PAPER 85-6092)

Engineering and biological data gathered with the research animal holding facilities (RAHFs) used on the Spacelab 3 mission are summarized. The animals totaled 24 rats and two squirrel monkeys. The RAHFs included biotelemetry, cameras and environmental monitoring equipment. The primary mission goal was engineering evaluation of the RAHFs and ancillary equipment. Tightly-fitted seals were found to be a necessity for keeping waste and food particles from contaminating the Spacelab equipment. All the rats returned with little muscle tone and suppressed immune systems. The monkeys displayed highly individual responses to spaceflight. Both species exhibited reduced abilities to maintain

meticulously clean furs in weightlessness. Details of several physiological changes detected during post-flight autopsies are provided. M.S.K.

**A86-17679\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**THE EFFECT OF HIGH ENERGY (HZE) PARTICLE RADIATION (AR-40) ON AGING PARAMETERS OF MOUSE HIPPOCAMPUS AND RETINA**

D. E. PHILPOTT, K. KATO, R. CORBETT, J. STEVENSON, S. BLACK (NASA, Ames Research Center, Moffett Field, CA), W. SAPP (Tuskegee Institute, AL), J. MIQUEL, K. A. LINDSETH (San Jose State University, CA), and E. V. BENTON (San Francisco, University, CA) *Scanning Electron Microscopy*, vol. 3, 1985, p. 1177-1182. refs

Eight month old C57BL6 mice were exposed (head only) to 0.5 rad or 50 rads of Argon particles at the Lawrence Berkeley Radiation Facility, CA. Neuromotor performance was assessed monthly for six months beginning twelve weeks post-irradiation using a 'string test'. The decline in motor performance was dose-related and none of the animals was able to complete the task after four months of testing. Morphological changes were monitored six and twelve months post-irradiation by light and electron microscopy. The synaptic density in the CA-1 area of the hippocampus decreased six and twelve months after irradiation. The decrease after twelve months was less than after six months. The width of the outer nuclear layer (ONL) of the retina increased with increasing dose. The number of blood vessels between the ONL and the ganglion layer decreased twelve months after irradiation and this area did not show significant accumulation of age pigment. Author

**A86-17808**

**THE UNIQUENESS OF ARCHAEBACTERIA**

R. A. GARRETT (Aarhus Universitet, Denmark) *Nature* (ISSN 0028-0836), vol. 318, Nov. 21, 1985, p. 233-235.

Recent advances in understanding the molecular biology of the archaeobacteria, which demonstrate the uniqueness of this kingdom, are reviewed. Findings on the characteristics of nucleotide sequences, genome instability, virus-host systems, the regulation of gene expression, and the presence of introns in the genome of archaeobacteria are summarized. Disputes concerning the origin of archaeobacteria are briefly reviewed. C.D.

**A86-18026\*** Saskatchewan Univ., Saskatoon.

**PLANETARY ECOLOGY; PROCEEDINGS OF THE SIXTH INTERNATIONAL SYMPOSIUM ON ENVIRONMENTAL BIOGEOCHEMISTRY, SANTA FE, NM, OCTOBER 10-14, 1983**

D. E. CALDWELL, ED. (Saskatchewan, University, Saskatoon, Canada), J. A. BRIERLEY, ED., and C. L. BRIERLEY, ED. Symposium supported by USGS, DOE, NASA, et al.; New York, Van Nostrand Reinhold Co., 1985, 604 p. For individual items see A86-18027 to A86-18034. (Contract NGW-378)

Topics presented include biological evolution and planetary chemistry; C-1 compounds; transport, deposition, and weathering; sulfur transformations; ground water; transformation processes for nitrogen oxides; and soils. Papers are presented on immunological studies on the organic matrix of recent and fossil invertebrate shells; biogenic gases in sediments deposited since Miocene times on the Walvis Ridge, South Atlantic Ocean; aspects of the biogeochemistry of Big Soda Lake, NV; mesophilic manganese-oxidizing bacteria from hydrothermal discharge areas at 21 deg North on the East Pacific Rise; and autotrophic growth and iron oxidation and inhibition kinetics of *Leptospirillum ferrooxidans*. Consideration is also given to thermophilic archaeobacteria occurring in submarine hydrothermal areas; fate of sulfate in a soft-water, acidic lake; geochemical conditions in the ground water environment; microbial transformations as sources and sinks for nitrogen oxides; and the biogeochemistry of soil phosphorus. I.S.



**A86-18027\*** Boston Univ., Mass.

**MICROBIAL MATS AND MODERN STROMATOLITES IN SHARK BAY, WESTERN AUSTRALIA**

S. GOLUBIC (Boston University, MA) IN: Planetary ecology; Proceedings of the Sixth International Symposium on Environmental Biogeochemistry, Santa Fe, NM, October 10-14, 1983. New York, Van Nostrand Reinhold Co., 1985, p. 3-16. Research supported by the Bureau of Mineral Resources, Baas Beeking Institute, and Roche Pharmaceutical Co. refs  
(Contract NSF GA-43391; NSF OCE-12999; NSF EAR-76-84233; NSF EAR-79-11200; NSF EAR-81-07686; NSG-7588; NAGW-141)

Distribution, external morphology, texture, and microbial composition of microbial mats in Hamelin Pool, Shark Bay, Western Australia, have been studied and reviewed along a composite representative profile starting from the permanently submerged zone, across the zones of periodic flooding, toward permanently emerged land and coastal dunes. The following nine types of algal mats have been recognized: colloform, gelatinous, smooth, pincushion, tufted, mamillate, film, reticulate, and blister. Solar ponds represent a particular environment. The mat types represent microbial communities that are characterized by one or more dominant microorganisms. The colonization and stabilization of loose sediment is carried out by a microbial assemblage of generalists that prepare the ground for later replacement and succession by specialized microflora. Lithification of microbial mats takes place periodically, mainly during the austral summer. This process is destructive for the microbial community but increases the preservation potential of the stromatolitic structures. Author

**A86-18029**

**PEPTIDOGLYCAN ENVELOPE IN THE CYANELLES OF GLAUCOCYSTIS NOSTOCHINEARUM**

O. T. SCOTT (Fort Lewis College, Durango, CO) IN: Planetary ecology; Proceedings of the Sixth International Symposium on Environmental Biogeochemistry, Santa Fe, NM, October 10-14, 1983. New York, Van Nostrand Reinhold Co., 1985, p. 27-40. Research supported by the Ford Foundation and Navajo Nation. refs

The cyanelles found in Glaucocystis have been investigated in several ultrastructural and biochemical studies in unsuccessful attempts to detect the presence of a peptidoglycan envelope, a basal layer of non-Archaeobacterial prokaryotic cell walls. Disruption of intact Glaucocystis cells with a glass tissue homogenizer permitted the isolation of the uniquely shaped cyanelles. Preservation of intactness and shape of the cyanelles in a hypotonic isolation medium was terminated by lysozyme at final concentrations of less than 50 micrograms g/ml. At 5 micrograms g/ml, lysozyme achieves lysis within a few seconds, and this was found to be the optimal concentration. Lysozyme-mediated lysis was inhibited by N-acetyl-glucosamine-2, a known competitive inhibitor. Diaminopimelic acid was detected by standard amino acid-analysis methods, prompting the conclusion that the cyanelles of Glaucocystis are cyanobacterial endosymbionts. Author

**A86-18031**

**ASPECTS OF THE BIOGEOCHEMISTRY OF BIG SODA LAKE, NEVADA**

R. S. OREMLAND, R. L. SMITH, and C. W. CULBERTSON (USGS, Menlo Park, CA) IN: Planetary ecology; Proceedings of the Sixth International Symposium on Environmental Biogeochemistry, Santa Fe, NM, October 10-14, 1983. New York, Van Nostrand Reinhold Co., 1985, p. 81-88. refs

Characteristics of Big Soda Lake, NV, including its pelagic productivity, rates of anaerobic mineralization (sulfate reduction, methane oxidation and methanogenesis), inorganic chemistry, seasonality, and littoral-zone processes, are presented on the basis of results from ongoing studies begun in 1980. The chemical analysis showed high S (5600 mg/l) and low Fe (less than 0.1 mg/l) contents. Annual water column productivity was found to be 500 gC/sq m, of which 60 percent is due to phytoplankton; 10 percent to purple photosynthetic bacteria, *Ectothiorhodospira vacuolata* (at a depth of 21 m); and 30 percent to bacterial chemocutotrophy occurring within the photosynthetic bacterial plate. The methanogenic activity was maximal at pH 9.7 (the pH of the Big Soda Lake waters) and was found to be supported noncompetitively by methanol, methylamines, and methionine (but not by H<sub>2</sub>, acetate, or formate). No detectable N<sub>2</sub> fixation or denitrification was found in water columns of the upper 30 m, although in the littoral zone an N-fixing cyanobacterium colonizes the plant (*Ruppia* sp.) beds in midsummer. I.S.

**A86-18032**

**MESOPHILIC MANGANESE-OXIDIZING BACTERIA FROM HYDROTHERMAL DISCHARGE AREAS AT 21 DEG NORTH ON THE EAST PACIFIC RISE**

H. L. EHRLICH (Rensselaer Polytechnic Institute, Troy, NY) IN: Planetary ecology; Proceedings of the Sixth International Symposium on Environmental Biogeochemistry, Santa Fe, NM, October 10-14, 1983. New York, Van Nostrand Reinhold Co., 1985, p. 186-194. refs

**A86-18033**

**AUTOTROPHIC AND MIXOTROPHIC GROWTH AND METABOLISM OF SOME MODERATELY THERMOACIDOPHILIC IRON-OXIDIZING BACTERIA**

A. P. WOOD and D. P. KELLY (Warwick, University, Coventry, England) IN: Planetary ecology; Proceedings of the Sixth International Symposium on Environmental Biogeochemistry, Santa Fe, NM, October 10-14, 1983. New York, Van Nostrand Reinhold Co., 1985, p. 251-262. Research supported by Biogen, S.A. refs

**A86-18034**

**THERMOPHILIC ARCHAEABACTERIA OCCURRING IN SUBMARINE HYDROTHERMAL AREAS**

K. O. STETTER (Regensburg, Universitaet, West Germany) IN: Planetary ecology; Proceedings of the Sixth International Symposium on Environmental Biogeochemistry, Santa Fe, NM, October 10-14, 1983. New York, Van Nostrand Reinhold Co., 1985, p. 320-332. refs

Extremely thermophilic anaerobic archaeobacteria have been isolated from submarine solfatara fields in Italy. They are sulfur-hydrogen autotrophs, sulfur respirers, methanogens, and fermentative organisms. The most extremely thermophilic isolates grow between 80 and 110 C, with an optimum around 105 C.

Author

**A86-18030**

**RECOVERY OF VIABLE THERMOACTINOMYCES VULGARIS AND OTHER AEROBIC HETEROTROPIC THERMOPHILES FROM A VARVED SEQUENCE OF ANCIENT LAKE SEDIMENT**

N. L. PARDUHN and J. R. WATTERSON (USGS, Denver, CO) IN: Planetary ecology; Proceedings of the Sixth International Symposium on Environmental Biogeochemistry, Santa Fe, NM, October 10-14, 1983. New York, Van Nostrand Reinhold Co., 1985, p. 41-53. refs

**A86-18150**

**CHANGES IN THE MORPHOFUNCTIONAL AND CYTOCHEMICAL INDICES OF BLOOD LEUKOCYTES AFTER EXPOSURE TO LOW-INTENSITY MICROWAVE RADIATION [KHARAKTER IZMENENIIA MORFOFUNKTSIONAL'NYKH I TSITOKHIMICHESKIKH POKAZATELEI LEIKOTSITOV KROVI PRI VOZDEITSTVII NA ORGANIZM MIKROVOLN NIZKIKH INTENSIVNOSTEI]**

M. I. RUDNEV and N. M. GONCHAR (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR) Radiobiologiya (ISSN 0033-8192), vol. 25, Sept.-Oct. 1985, p. 645-649. In Russian. refs

**A86-18181**

**RESPONSES OF CAT RED-NUCLEUS NEURONS TO AUDITORY SIGNALS [REAKTSII NEIRONOV KRASNOGO IADRA KOSHKI NA ZVUKOVYE SIGNALY]**

S. A. SHINKARENKO, N. V. BRATUS, and I. N. KUDRIAVTSEVA (Vinnitskii Meditsinskii Institut, Vinnitsa, Ukrainian SSR; AN SSSR, Institut Fiziologii, Leningrad, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 284, no. 6, 1985, p. 1506-1509. In Russian. refs

**A86-18397\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**INCREASED GLUCONEOGENESIS IN RATS EXPOSED TO HYPER-G STRESS**

B. C. DALIGCON, J. OYAMA, and K. HANNAK (NASA, Ames Research Center, Moffett Field, CA) Life Sciences (ISSN 0024-3205), vol. 37, no. 3, 1985, p. 235-241. refs

The effect of glucogenesis on the plasma glucose and liver glycogen of rats exposed to hyper-G stress is investigated. Twelve male Sprague-Dawley rats are injected with C-14 lactate, alanine, of glycerol, and six of the rats are exposed to 3.1 G for 0.25, 0.50, and 1.0 hr. The plasma glucose and liver glycogen of the centrifuged and noncentrifuged rats are analyzed. A significant increase in the C-14 incorporation of the substrate into the plasma glucose and liver glycogen is observed in the centrifuged rats. The injection of 5-methoxyindole-2-carboxylic acid, a gluconeogenesis inhibitor, results in a blocked increase in plasma glucose and liver glycogen. The role of epinephrine on the hyperglycemic and liver glycogen responses of centrifuged rats is studied. It is concluded that the initial increase in plasma glucose and liver glycogen in rats exposed to hyper-G stress is the result of an increased rate of gluconeogenesis. I.F.

**A86-18398\*** Wisconsin Univ., Madison.

**A MATERNAL DEFECT IS RESPONSIBLE FOR GROWTH FAILURE IN VITAMIN D-DEFICIENT RAT PUPS**

R. BROMMAGE and H. F. DELUCA (Wisconsin, University, Madison) American Journal of Physiology: Endocrinology and Metabolism (ISSN 0193-1849), vol. 246, 1984, p. E221-E226. Research supported by the Wisconsin Alumni Research Foundation. refs

(Contract NAG2-167; NIH-AM-14881)

**A86-18399\*** Wisconsin Univ., Madison.

**VITAMIN D-DEFICIENT RATS PRODUCE REDUCED QUANTITIES OF A NUTRITIONALLY ADEQUATE MILK**

R. BROMMAGE and H. F. DELUCA (Wisconsin, University, Madison) American Journal of Physiology: Endocrinology and Metabolism (ISSN 0193-1849), vol. 246, 1984, p. E221-E226. Research supported by the Wisconsin Alumni Research Foundation. refs

(Contract NAG2-167; NIH-AM-14881)

**A86-18400\*** Wisconsin Univ., Madison.

**1,25-DIHYDROXYVITAMIN D3 NORMALIZES MATERNAL FOOD CONSUMPTION AND PUP GROWTH IN RATS**

R. BROMMAGE, K. JARNAGIN, and H. F. DELUCA (Wisconsin, University, Madison) American Journal of Physiology: Endocrinology and Metabolism (ISSN 0193-1849), vol. 246, 1984, p. E227-E231. Research supported by the Wisconsin Alumni Research Foundation. refs

(Contract NAG2-167; NIH-AM-14881)

**A86-18513**

**THE EFFECT OF A MICROWAVE RADIATION (2.45 GHZ CW) ON THE MOLT OF HOUSE FINCHES (CARPODacus MEXICANUS)**

F. E. WASSERMAN, T. H. KUNZ (Boston University, MA), T. LLOYD-EVANS (Manomet Bird Observatory, MA), S. P. BATTISTA (Arthur D. Little, Inc., Cambridge, MA), and D. BYMAN (Pennsylvania State University, Dunmore) Space Solar Power Review (ISSN 0191-9067), vol. 5, no. 3, 1985, p. 261-270. refs

(Contract EPA-68-02-3278)

**A86-18744**

**VISUAL PERCEPTION AND MEMORY: INFORMATION PROCESSES AND NEURON MECHANISMS [ZRITEL'NOE VOSPRIIATIE I PAMIAT': INFORMATSIONNYE PROTSESSY I NEIRONNYE MEKHANIZMY]**

K. N. DUDKIN (Leningrad, Izdatel'stvo Nauka, 1985, 208 p. In Russian. refs

The process of visual perception (VP) is based on sensorial information, but cannot take place without the participation of memory. The physiological mechanisms involved in three types of visual memory (iconic, short-term, and long-term memory) and their role in VP is examined. Theories of detector-mediated VP (through detectors of edge, contour, brightness, and other features of the object) and spatial frequency filtering are discussed, and results of psychophysical, electrophysiological, and behavioral experiments are presented in support of the theoretical models. It is concluded that the concepts of spatial frequency filters and features detectors supplement each other and must be both invoked to explain the experimental observations. I.S.

**A86-18840**

**EFFECT OF FASTING ON HYPOXIA TOLERANCE OF MICE IN RELATION TO OXYGEN CONSUMPTION AND HEART RATE**

T. SUZUKI (Tokyo, University, Japan) and C. WATANABE (Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1198-1202. refs

Mice more than 8 weeks old were fasted for 1 or 2 d and challenged by severe acute hypoxia. The hypoxia survival times (ST) were compared to the body weight, oxygen consumption, or heart rate (HR) of each animal. The duration of fasting was found to be important in determining ST. Oxygen consumption or HR was negatively correlated with ST, whether mice were fasted or not. The regression line (lnST on HR) in the fed (control) group did not significantly differ from that of 2-d fasted groups, but those of fed and 1-d fasted groups differed. These results suggest that, in fasting for 2 d, the reduction in energy consumption was a major determining factor of hypoxia survival; in 1-d fasting, other factors might operate to determine the tolerance. Author

**A86-18841**

**PLASMA VOLUME AND ESTIMATED LIVER PLASMA FLOW DURING HYPERBARIC AND HYPEROXIC EXPOSURES IN AWAKE DOGS**

D. R. GROSS, B. J. GENTILE, D. W. WELCH, W. P. FIFE (Texas A & M University, College Station), and W. G. KRAMER (Houston, University, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1203-1208. refs

(Contract PHS-210-81-6103; NOAA-NA-81AAD00092)

A86-18842

**FURTHER STUDIES ON THE APPLICATION OF THE COMPARTMENTALIZATION/AIRLOCK CONCEPT TO AIRCRAFT AND SPACECRAFT**

H. S. FANG, M. L. TSAI, and I. T. LEA (National Taiwan University, Taipei, Republic of China) *Aviation, Space, and Environmental Medicine* (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1209-1212. Sponsorship: National Science Council of the Republic of China. refs

(Contract NSC-72-0412-B002-22)

The effect of the application of the compartmentalization/airlock on accidental decompression was studied in conscious rats, mice, and guinea pigs. It was observed that in unprotected rats and mice, 78 of 102 middle ears (76.5 percent) exhibited hemorrhages with their eardrums intact; and in unprotected guinea pigs, 37 of 50 eardrums (74 percent) revealed rupture associated with hemorrhages of all middle ears (100 percent). Seven cases of malleus fractures (14 percent) were also found in unprotected guinea pigs. On the other hand, none of the protected animals showed signs of middle ear barotrauma. The protective effect on the tolerance of middle ears in the present study showed the same tendency as that on the tolerance of lungs in a previous study. These findings indicate that the application of the compartmentalization/airlock would be of great value in protection against accidental rapid decompression of pressurized aircraft and spacecraft. Author

N86-14839# Desmatics, Inc., State College, Pa.

**A NONLINEAR REGRESSION PROCEDURE FOR EVOKED POTENTIAL DATA ANALYSIS**

C. A. MAURO Jun. 1985 47 p

(Contract N00014-79-C-0128)

(AD-A157680; TR-112-18) Avail: NTIS HC A03/MF A01 CSDL 06S

The recording and subsequent analysis of evoked potential activity has proven useful for the evaluation of neural dysfunction resulting from impact acceleration injury involving the head and neck. In animal impact acceleration experiments involving Rhesus monkeys, somatosensory evoked potentials showed an increase in latency following nonlethal experiments. In order to assess quantitatively and objectively the amplitude and duration of the latency effect following impact acceleration, a nonlinear mathematical model has been proposed. This technical report describes a nonlinear regression procedure for fitting the proposed model directly to empirical latency data. A FORTRAN computer program listing is provided. Author (GRA)

N86-14840# Office of Naval Research, London (England).

**BIOMATERIALS RESEARCH IN WEST GERMANY: AN ASSESSMENT Technical Report**

T. C. ROZZELL 14 Aug. 1985 15 p

(AD-A158951; ONRL-R-3-85) Avail: NTIS HC A02/MF A01 CSDL 06E

West Germany is one of the leading countries in Europe for research in biomaterials. Researchers have developed a number of new techniques and methods utilizing a wide range of synthetic and natural materials for use in medicine. Exotic ceramics, metals, and plastics are being used both in animals and in humans for such things as tissue repair, wound coverings, drug delivery, and prostheses. The West German scientists, bioengineers, and clinicians are very aggressive in attacking new problems related to the use of biomaterials in therapy. GRA

N86-14841# Office of Naval Research, London (England).

**BIOLOGICAL SCIENCES AND BIOELECTROMAGNETICS IN EUROPE Summary Technical Report**

T. C. ROZZELL 26 Aug. 1985 38 p

(AD-A159221; ONRL-R-4-85) Avail: NTIS HC A03/MF A01 CSDL 06E

This report examines in detail bioelectromagnetics research in Europe and provides an overview of several aspects of general biomedical, biomaterials, and biotechnological research. GRA

N86-14842# Washington Univ., Seattle. Bioelectromagnetics Research Lab.

**EFFECTS OF LONG-TERM LOW-LEVEL RADIOFREQUENCY RADIATION EXPOSURE ON RATS. VOLUME 9: SUMMARY Final Report, Jun. 1980 - Jul. 1984**

A. W. GUY, C. K. CHOU, L. L. KUNZ, J. CROWLEY, and J. KRUPP Aug. 1985 24 p

(Contract F33615-80-C-0612)

(AD-A159512; SR-29; USAFSAM-TR-85-64) Avail: NTIS HC A02/MF A01 CSDL 06R

For 25 months 100 male SPF rats were exposed to pulsed 2450-MHz circularly polarized microwaves at an average power density of 0.48 mW/sq cm. Another 100 rats served as sham-exposed controls. This report summarizes the results of the eight previous volumes which reported on measurements of 155 parameters. For most of the parameters no statistical difference was found between the exposed and sham-exposed groups. This report discusses a few end-points that were statistically different. GRA

N86-14843# Kentucky Univ., Lexington.

**PHYSIOLOGY/BIOCHEMISTRY OF PHOTOACTIVATION OF O<sub>2</sub> EVOLUTION: PROBES FOR THE S-STATE PROTEIN Progress Report, 1 Jun. 1983 - 31 May 1985**

G. M. CHENIAE Mar. 1985 14 p refs

(Contract DE-AS05-83ER-13072)

(DE85-016834; DOE/ER-13072/1) Avail: NTIS HC A02/MF A01

This work details the conditions necessary to achieve routinely the complete photoactivation of virtually totally inactive water oxidizing complexes in NH<sub>2</sub>OH extracted leaf segments. The photoactivation process per se proved entirely similar to the process previously described for Mn deficient algae, Mn sufficient algae cultured heterotrophically, and NH<sub>2</sub>OH extracted algae. Further studies showed that without dark preincubation of NH<sub>2</sub>OH extracted leaf segments PS 2, but not PS 1, was susceptible to weak light photoinhibition (t<sub>1/2</sub> approx. 2.5 min). Also reported are studies which kinetically characterize the photoinhibition process using NH<sub>2</sub>OH or Tris extracted isolated chloroplasts, prove the site affected resides on the oxidant side of PS 2, and give preliminary identification of the polypeptide which must be synthesized on chloroplast 70S ribosomes for the recovery from photoinhibition and for recovery of the capacity of PS 2 to carry-out photoactivation of the Mn-S-state enzyme. DOE

N86-14844# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.

**QUANTITATIVE MODELS DESCRIBING THE KINETICS OF TUMOR CELL PROLIFERATION: A COMPARISON TO EXPERIMENTAL DATA**

J. ATEN (Amsterdam Univ.) and J. GRASMAN Dec. 1984 9 p refs

(CWI-AM-R8418; B8565125; AD-B093143L) Avail: NTIS HC A02/MF A01

Pedigrees of cells from a mouse osteosarcoma line are analyzed. The generation time data of cells of 12 pedigrees is used to estimate the parameters in two transition probability models of the cell cycle. In cultures perturbed by a change of culture medium, generation times are shorter than in control cultures. In the control cultures, seven cells with anomalously large division delays were deleted in the process of estimating the parameters in the transition probability models. In the data of pedigrees of irradiated cells such cases occur more frequently. This is a strong indication that a quiescent state must be introduced in the model of the cell cycle and that a delay due to DNA repair must be taken into account. In a test of the model of Brooks, Bennett and Smith (1980) the data of sister-sister correlations contained the necessary information to reject this model for cells a mouse osteosarcoma line. Author (ESA)

## **N86-14845# Joint Publications Research Service, Arlington, Va. USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES**

29 Jan. 1985 121 p Transl. into ENGLISH from various Russian articles (JPRS-UBB-85-004) Avail: NTIS HC A06

Progress in U.S.S.R. biomedical and behavioral sciences is reported. Topics discussed include: a grotechnology; biochemistry; bionics; biotechnology; environment; human factors; laser effects; medicine; microbiology; public health; and radiation biology.

## **N86-14847# Joint Publications Research Service, Arlington, Va. RADIOSENSITIVITY OF ANIMALS IRRADIATED IN MODIFIED GAS MEDIUM: MODIFICATION OF CEREBRAL SYNDROME IN MICE BY HYPOXIC HYPOXIA AND HYPEROXIA DURING IRRADIATION**

I. B. USHAKOV and M. M. ABRAMOV *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-85-004) p 110-115 29 Jan. 1985 Transl. into ENGLISH from *Radiobiologiya (Moscow)*, v. 24, no. 5, Sep.-Oct. 1984 p 693-697

Avail: NTIS HC A06

The effect of breathing pure normobaric oxygen on the radiosensitivity of hemopoietic tissue and the small intestine was studied previously. The possible modifying action of hyperoxia and hypoxic gas mixtures (HGM) on the course of the cerebral syndrome was evaluated. Thus the authors who studied rabbits that succumbed to radiation, diagnosed a higher oxygen demand in the irradiated animals and recommended the use of oxygen therapy in X-ray treatment of head tumors. Irradiation of the heads of mice with 8 meV electrons in doses greater than 350 Gr produced what the authors believe to be a paradoxical result: Pure normobaric oxygen had a protective effect, as is true for anoxia, though the effect was significantly less pronounced. Presence of an oxygen effect (aggravation by oxygen and protection by HGM) was demonstrated with radiation doses of 0.052-0.258 Kl (expansion unknown)/kg and 47-123 Gr 6. In the latter case, however, the modifying effect was absent with radiation doses of 123-213.8 Gr. This paper evaluates possible modification of the cerebral syndrome in mice by a modified gas medium during gamma-irradiation of the head and torso. B.W.

## **N86-14848# Joint Publications Research Service, Arlington, Va. USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 19, NO. 5, SEPTEMBER - OCTOBER 1985**

O. G. GAZENKO, ed. 25 Nov. 1985 147 p refs Transl. into ENGLISH of *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow)*, v. 19, no. 5, Sep. - Oct. 1985 96 p (JPRS-USB-85-007) Avail: NTIS HC A07

Progress in Soviet space biology and aerospace medicine is reported. Topics discussed include: regular diet aspects of cosmonauts, metabolic distinctions in human red blood cells, hypokinesia, long term space flight effects, circulation and hemostasis in borderline hypertension, cardiac changes for dogs during extended hypokinesia, microelectronics, medical equipment tests, pharmacology, neurosciences.

## **N86-14856# Joint Publications Research Service, Arlington, Va. ROENTGENOLOGICAL AND PATHOMORPHOLOGICAL CHANGES IN HEART OF DOGS SUBMITTED TO HYPOKINESIA FOR SIX MONTHS**

I. G. KRASNYYKH, N. A. GAYDAMAKIN, and V. G. PETRUKHIN *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 54-59 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow)*, v. 19, no. 5, Sep. - Oct. 1985 p 41-46

Avail: NTIS HC A07

The effect of 6-month hypokinesia on the cardiac function and pathomorphological changes in dogs was investigated. The heart size during systolic and diastolic contractions, stroke volume and contractile function were measured once a month using an X-ray unit and a kymograph. After the hypokinetic exposure six dogs

were sacrificed and their hearts were examined morphologically and histochemically. The recovery processes were investigated on two other dogs that were allowed to survive for 30 days after exposure. The 6-month hypokinesia led to a significant decrease in the heart size, stroke volume, cardiac index and the contractile function. Morphological examinations revealed atrophic changes in the myocardium. Electron-microscopy investigations demonstrated focal destructive changes in myofibers and in mitochondria, some of them were dense while others had a more transparent matrix and degraded cristae. Histochemical data also suggest atrophic and destructive changes in the myocardium.

E.A.K.

## **N86-14857# Joint Publications Research Service, Arlington, Va. CHANGES IN PHYSICAL CONDITION, VESTIBULAR FUNCTION AND BONE SYSTEM OF RATS SUBMITTED TO LONG-TERM ROTATION**

A. A. SHIPOV, V. N. SHVETS, L. A. TABAKOVA, and O. Y. KABITSKAYA *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 60-69 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow)*, v. 19, no. 5, Sep. - Oct. 1985 p 46-53

Avail: NTIS HC A07

Unrestrained rats were rotated for 21 and 30 days at 1.1 and 2.0 G. The exposure did not deteriorate their equilibrium function or physical condition, however, the exposure decreased the reactivity and sensitivity of the semicircular canals. Bone parameters, longitudinal and transverse bone growth, metacarpophysis morphometry, indicated that the rats developed an acute stress reaction accompanied by an inhibited growth of limb bones during the first 7 days of rotation. By experimental day 30 the animals became adapted to the new environment. E.A.K.

## **N86-14858# Joint Publications Research Service, Arlington, Va. CONTRACTILE PROPERTIES OF RAT MUSCLE FIBERS DURING LONG-TERM EXPOSURE TO +2 GX ACCELERATIONS**

V. S. OGANOV, S. A. SHURATOVA, and M. A. SHIRVINSKAYA *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 70-74 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow)*, v. 19, no. 5, Sep. - Oct. 1985 p 53-56

Avail: NTIS HC A07

The effect of 21-day exposure to +2 Gx and +1.1 Gx on the contractile properties of different muscle groups of rate fore- and hindlimbs was examined, using glycerinated myofibers in the ATP+Ca sq solution. It was found that the isometric contraction strength and velocity increased, the performance of the postural extensors also grew; that of the soleus m. in the +2 Gx rats and that of the triceps brachii m. in the +2 Gx and +1.1 Gx rats. The contractile changes of the flexors of fore- and hindlimbs were insignificant and sometimes oppositely directed. The different responses of the muscles to acceleration were associated with the differences in their function, metabolism and biomechanics.

E.A.K.

## **N86-14868# Joint Publications Research Service, Arlington, Va. DRUGS AND SURFACTANTS USED TO PREVENT CAISSON DISEASE IN RATS**

V. V. VLASOV *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 123-126 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow)*, v. 19, no. 5, Sep. - Oct. 1985 p 86-87

Avail: NTIS HC A07

Changes in the blood-clotting system and vascular reactions have a substantial effect on rate of gas production, rate of escape of gas through the lungs, size of bubbles and their stability in development of decompression sickness. These reactions are an important factor that determines tolerance to decompression. By altering the body's reaction to the free gas phase that appears in

tissues one can deliberately influence tolerance to decompression. Drugs medication capable of enhancing tolerance to decompression were investigated and the effects of some surfactants (SF) on the course of caisson disease are examined.

E.A.K.

**N86-14869#** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF 24,25-DIHYDROXYCHOLECALCIFEROL ON AMINO ACID METABOLISM OF HYPOKINETIC RATS**

T. F. VLASOVA, Y. B. MIROSHNIKOVA, M. S. BELAKOVSKIY, A. N. KOCHETKOVA, and I. N. SERGEYEV *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 127-129 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 88-89  
 Avail: NTIS HC A07

A 30-day restriction of motor activity of animals against the background of diets differing in calcium and phosphorus content led to decline of amino acid pool of blood, and excessive uptake of phosphorus aggravated the effect of hypokinesia. The effect of 24,25-dihydroxycholecalciferol-24,25(OH)<sub>2</sub>D<sub>3</sub> -- on amino acid metabolism of animals, are discussed and the use of this compound together with other agents for prevention and treatment of mineral metabolism under hypokinetic conditions is outlined. The possibility of normalizing amino acid metabolism under hypokinetic conditions with use of diets with a specific proportion of calcium and phosphorus and supplemental administration to animals of an active metabolite of vitamin D<sub>3</sub>-24,25(OH)<sub>2</sub>D<sub>3</sub> is explored.

E.A.K.

**N86-14870#** Joint Publications Research Service, Arlington, Va.  
**BIOCIDAL SYNTHETIC COATINGS BASED ON HIGH-MOLECULAR METALOORGANIC COMPOUNDS**

V. F. MISHCHENKO, V. A. ZUBOV, and Y. G. YEREMENKO *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 130-134 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 89-92  
 Avail: NTIS HC A07

Long-term stays of man and animals in closed life-support systems lead to contamination of the room and objects in it by various microorganisms. Traditional sterilization methods was found to be either ineffective or extremely difficult and unsafe. Use of biologically active paint and varnish is an effective means of preventing development of microorganisms in closed life-support systems when they contain as biocidal supplements low-molecular organic compounds, organic derivatives of arsenic, mercury and copper. However, these materials are often highly toxic for man and animals. The low-molecular compounds used as biocidal additives in paint and varnish do not yield the desired result, since this biocidal agents usually do not have a broad spectrum of protective action. Due to constant exudation, the biocidal agents are utilized unwisely, which ultimately leads to reduction of efficacy and duration of protective action of the coating.

E.A.K.

**N86-15859#** School of Aerospace Medicine, Brooks AFB, Tex.  
**POTENCY OF PHOTOFLASH-PRODUCED RETROGRADE AMNESIA IN RATS** Final Technical Paper, Dec. 1983 - Mar. 1984

K. R. PAGE and T. G. WHEELER Jul. 1985 12 p  
 (Contract AF PROJ. 7757)  
 (AD-A159149; USAFSAM-TP-85-1) Avail: NTIS HC A02/MF A01 CSCL 05I

A photoflash has been shown to be an effective amnesiac under certain conditions. The objective of this study was to evaluate the effectiveness of a photoflash in relation to the potency of the preceding event, a foot shock of varying intensities. The task was a single avoidance-trial paradigm. The subject was placed in a small aversive chamber with a door that allowed the subject to enter a large, preferred chamber. Once inside the preferred chamber, the subject received a 1-s foot shock followed by a photoflash. On the avoidance trail, the subject was again placed

in the aversive chamber and the time required to enter the preferred chamber was measured. If the photoflash had produced retrograde amnesia (RA), the time required to enter would be small. Retrograde amnesia was demonstrated for the 80-, 85-, and 100-V foot-shock test trials. At 40 V the voltage may not have been great enough to be felt by the subject. For groups examined at shock levels above 100 V, the foot shock was so potent that a photoflash was ineffective in producing RA. Our conclusion was that the photoflash was an effective amnesiac until the intensity of the foot shock became more potent than the photoflash; this is consistent with the recency theory generated in serial learning and memory tasks.

GRA

**N86-15860#** California Inst. of Tech., Pasadena. Lab. of Chemical Physics.

**APPLICATION OF ELECTRON-TRANSFER THEORY TO SEVERAL SYSTEMS OF BIOLOGICAL INTEREST**

R. A. MARCUS and N. SUTIN 1985 9 p refs Presented at the Workshop on Antennas and Reaction Centers of Photosynthetic Bacteria - Structure, Interactions and Dynamics, Feldafing, West Germany, 23 Mar. 1985 Brookhaven National Lab., Upton, N.Y. (Contract DE-AC02-76CH-00016)  
 (DE85-015835; BNL-36836; CONF-8503159-1) Avail: NTIS HC A02/MF A01

Electron-transfer reaction rates are compared with theretically calculated values for several reactions in the bacterial photosynthetic reaction center. A second aspect of the theory, the cross-relation, is illustrated using protein-protein electron transfers.

DOE

**N86-15861#** Case Western Reserve Univ., Cleveland, Ohio.  
**ELECTRON REACTIONS IN MODEL AND BIOLOGICAL SYSTEMS**

G. BAKALE 1985 6 p refs Presented at DOE Radiological and Chemical Physics Contractors' Meeting, Richland, Washington, 9 Apr. 1985  
 (Contract DE-AC02-78EV-04746)  
 (DE85-016062; CONF-8504170-1) Avail: NTIS HC A02/MF A01

Our pulse-conductivity studies of electrons in nonpolar liquids and reversed-micellar solutions in which electron mobilities, (MU) sub e 's, that range from 10 to the power -3 to 1000 sq cm/Vs and electron-attachment rate constants, k sub e 's, that range from 10 to the 8th power to 10 to the 14th power MM to the -1 s to the -1 will be briefly described as well as the mechanisms of electron transport and attachment that are consistent with this millionfold range of (MU) sub e's and k sub e's. Included among the electron-attachment results presented will be the K sub e's of 150 chemicals that have been classified using animal tests as being carcinogens or noncarcinogens. The k sub e-carcinogenicity correlation will be compared with the bacterial mutagenicity-carcinogenicity correlation which is the basis of the Ames Salmonella bioassay, the short-term test that is most widely used to screen potentially carcinogenic chemicals. Finally, our use of the Ames Salmonella tester strains as a biological detector of electrophilic carcinogens will be discussed.

DOE

**N86-15862#** Oak Ridge National Lab., Tenn.  
**FREEZING OF LIVING CELLS**

P. MAZUR 1985 24 p refs Presented at the 2nd National Summer School on Cryobiology and Freeze-Drying, Toulbouchin, Bulgaria, 1 Aug. 1985  
 (Contract DE-AC05-84OR-21400)

(DE85-016297; CONF-8508116-1) Avail: NTIS HC A02/MF A01

It can be calculated that a living cell will survive more than 5000 years at -196 C. This ability to essentially stop biological time has important implications in medicine and agriculture, and in biological research. In medicine the chief implications are in the banking of transplantable tissues and organs and in vitro fertilization. In agriculture the applications stem in part from the role of frozen embryos in amplifying the number of calves produced by high quality cows. The problem is how can cells survive both the cooling to such very low temperatures and the return to normal temperatures. The answers involve fundamental characteristics of

cells such as the permeability of their surface membranes to water and solutes. These characteristics determine whether or not cells undergo lethal internal ice formation and other response during freezing and thawing. DOE

**N86-15863#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abt. Weltraumbiologie.

**INVESTIGATIONS OF THE EFFECTS OF GRAVITY ON PARAMECIUM CAUDATUM STRUCTURE AND BEHAVIOR Thesis - Bonn Univ.**

R. HEMMERSBACH Jul. 1985 70 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-963)

(DFVLR-FB-85-40; ISSN-0171-1342) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 27

Paramecium caudatum was used to study the behavior of the contractile vacuolar system, the nutrient uptake, cyclose, multiplication rate, and ultrastructure under simulated weightlessness using a fast-running clinostat and a modified agar method. In comparing 0 and 1 g behavior, no modification is detected, except for the vacuolar system. The slowed and irregular functioning behavior of the contractile vacuolar system due to an inner timing modification is influenced by gravity. Negative geotaxis of Paramecium caudatum is not confirmed. The effects of gravity on vacuole formation, situation, and number cannot be determined. Author (ESA)

**N86-15864#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteilung Biophysik.

**ON THE EFFECTS OF X IRRADIATION ON THE BACILLUS SUBTILIS SPORES IN A DRY AND WET SYSTEM Thesis - Fachhochschule, Glessen, West Germany**

E. WOIZENKO Apr. 1985 82 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-968)

(DFVLR-FB-85-44; ISSN-0171-1342) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 29

Bacillus subtilis spores were irradiated to study the influence of intracellular water and to explain the modulating role of water in the development of biological radiation damage. The effects of repair deficiency in mutants regarding sensitivity to radiation in dry and wet systems were studied to explain the damage process in correlation with cell water content. The experiments were verified in multiplication rate and lag phase curves. Wild and mutant species are more sensible to ionizing radiation in a dry medium than in a wet medium. The water content used as a radiation protective substance reduces inactivation. Rec+ species (wild species) is more sensitive to ionizing radiation under extremely dry conditions and in a vacuum than Rec- species (mutants) due to a reduced repair ability. Rec- species deficient in the Rec A gene develop other repair processes to compensate for damage. The results show the variety of the cell repair processes. Author (ESA)

**N86-15865#** Joint Publications Research Service, Arlington, Va. **USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 19, NO. 4, JULY - AUGUST 1985**

O. G. GAZENKO, ed. 4 Nov. 1985 156 p refs Transl. into ENGLISH of Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul.-Aug. 1985 96 p (JPRS-USB-85-006) Avail: NTIS HC A08

Biological and medical problems encountered in space flight are the subjects of journal articles from the U.S.S.R. Some sample titles are: (1) determining human physical work capacity; (2) effect of threat stress on psychomotor stability of pilots differing in anxiety levels; (3) effect of 7 day immersion hypokinesia on characteristics of precision movements; (4) long term rotation of rats as applied to the problem of artificial gravity; (5) microflora of chufa, a potential higher plant component of biological life support systems for man; (6) crew training; and (7) automatic determination of cardiac output from rheogram of the trunk.

**N86-15876#** Joint Publications Research Service, Arlington, Va. **INTENSITY OF LIPID PEROXIDATION IN HYPOKINETIC RAT TISSUES**

T. Y. SHIDLOVSKAYA In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 65-69 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 45-48

Avail: NTIS HC A08

The intensity of lipid peroxidation in the homogenates and mitochondria of the liver, heart and skeletal muscle of hypokinetic rats was measured. The primary products of lipid peroxidation, i.e., diene conjugates, were accumulated in all tissues on hypokinesia days 3, 15 and 30. The content of the final product--malonic dialdehyde--in the mitochondria increased on hypokinesia days 15 and 30. The low level of NADPH, an ascorbate-dependent lipid peroxidation, in the mitochondria at early stages of hypokinesia (up to 15 days) and diene conjugates in homogenates on hypokinesia day 7 can be attributed to an activation of the protective systems of the organism against the immobilization stress. It is suggested that at early stages of hypokinesia the process of lipid peroxidation, or to be more precise, lipid hydroperoxidation can be blocked. Author

**N86-15877#** Joint Publications Research Service, Arlington, Va. **EFFECT OF 24,25-DIHYDROXYVITAMIN D3 ON OSTEOGENETIC PRECURSOR CELLS IN IMMOBILIZED RATS**

V. N. SHVETS, T. Y. BURKOVSKAYA, Z. Y. VNUKOVA, and O. Y. KABITSKAYA In its USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 70-76 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 48-53

Avail: NTIS HC A08

The experiments were carried out on Wistar SPF rats that were immobilized for 35 days. By heterotopic marrow cell transplantation under the kidney capsule to the normal rats and by cloning these cells in vitro it was found that osteogenetic potentials were significantly inhibited and the amount of osteogenetic precursor cells was reduced. The addition of 24,25(OH)<sub>2</sub>D<sub>3</sub> vitamin (at a dose of 1.25 micrograms per day) to the animal die led to the normalization of the above parameters. It is assumed that immobilization-associated osteoporosis develops via, among other mechanisms, inhibition of histogenesis of stromal precursor cells. The beneficial role of vitamin D<sub>3</sub> is actually the activation of histogenesis of these cells which results in the recovery of bone remodelling during immobilization. Author

**N86-15878#** Joint Publications Research Service, Arlington, Va. **BASIC RESULTS OF EXPERIMENTS WITH LONG-TERM ROTATION OF RATS AS APPLIED TO THE PROBLEM OF ARTIFICIAL GRAVITY**

A. R. KOTOVSKAYA, I. B. KRASNOV, and A. A. SHIPOV In its USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 77-81 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 53-57

Avail: NTIS HC A08

Rats housed as a group per cage were centrifuged for 21 and 30 days at 1.1 and 2.0 G. The following parameters were measured: (1) motor activity, body mass, static and dynamic endurance, acceleration (+Gz) tolerance, vestibular function, equilibrium function, skeletal muscle contractility, bone dynamics, gas exchange, blood biochemistry, weight of adrenals, thymus and thyroid gland; (2) morphology of adrenals, thyroid gland, and cortex of the cerebellum nodulus; and (3) biochemistry of blood hormones, energy metabolism enzymes in the liver, bone phosphatase, myosin Ca-Mg-ATPase in the myocardium, protein sulfhydryl groups in the cerebellar motor cortex. It was demonstrated that prolonged (1/50 of their life time) centrifugation of unrestrained rats causes no deterioration of many physiological functions, i.e., rotation produces no adverse effects on the animal body. Author



**N86-15881#** Joint Publications Research Service, Arlington, Va.  
**DETERMINATION OF INCREMENT OF BACILLUS SUBTILIS BIOMASS IN WEIGHTLESSNESS**

F. BERGTER, D. HARZ, P. J. MULLER, K. MUND, U. GUNTER, T. HESSE, R. HARTMANN, G. WANKE, M. G. TAIRBEKOV, G. P. PARFENOV et al. *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 92-95 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 63-65

Avail: NTIS HC A08

This paper presents the results of a microbiological experiment carried out by the Soviet and GDR scientists onboard SALYUT-6. The experiment was performed using a *Bacillus subtilis* suspension in the Jena unit. The purpose of the experiment was to study the time-course variations of the cell biomass increase in zero-g. The cell culture development was measured with respect to the utilization rate of glucose or casein hydrolysate in the nutrient medium and the rate of protein accumulation in cells. It has been shown that the rate of biomass increment in zero-g lags behind the 1 g level. It can be concluded that the decreased metabolic activity of bacterial cells in zero-g is associated with changes in the cell population distribution and physiochemical parameters of the nutrient medium. Author

**N86-15882#** Joint Publications Research Service, Arlington, Va.  
**INVESTIGATION OF MICROFLORA OF CHUFA, A POTENTIAL HIGHER PLANT COMPONENT OF BIOLOGICAL LIFE-SUPPORT SYSTEMS FOR MAN**

L. S. YUNUSOVA and N. A. DRUGOVA *In its* USSR Report: Space Biology and Aerospace Medicine Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 96-100 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 65-68

Avail: NTIS HC A08

The microbiological characteristics of the chufa plant grown alone or in combination with wheat and vegetables were investigated. The results showed that the bacterial flora of chufa plants did not change significantly. The bacterial count decreased during nodule formation. The number of actinomycetes increased when chufa and wheat plants were grown together. By the end of vegetation fungi were accumulated in the chufa rhizosphere. Among the physiological groups involved in the transformation of nitrogen-containing compounds ammonifiers were predominant. At the germination stage ammonification and denitrification processes increased, cellulose-decomposing bacteria appeared, oligonitrophilic forms occurred. From the microbiological point of view chufa plants can be used in the higher plant component of the biological life support system. Author

**N86-15883#** Joint Publications Research Service, Arlington, Va.  
**INVESTIGATION OF DISTINCTIONS REFERABLE TO GROWTH, DEVELOPMENT AND METABOLISM OF CLOSTERIOPSIS ACICULARIS ALGAE WHEN CELLS ARE LIMITED IN NITROGEN AS RELATED TO BIOLOGICAL LIFE-SUPPORT SYSTEMS FOR MAN**

A. A. ANTONYAN, M. A. LEVINSKIKH, and N. I. SUKHOVA *In its* USSR Report: Space Biology and Aerospace Medicine Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 101-108 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 69-73

Avail: NTIS HC A08

The growth, development and metabolism of a new form of green unicellular algae *Closteriopsis acicularis* were investigated from the point of view of their potential use in the biological life support system (BLSS). Their growth and biochemical characteristics were studied as a function of nitrogen supply. During the nitrogen-deficiency cultivation the growth rate remained unchanged, cell division and biomass increment was uncoupled, and carbohydrate formation was predominant. The content of carbohydrates increased at the expense of assimilable fractions, particularly starch. These data can be used in the selection of an

optimum nitrogen level for the case of algal continuous cultivation, in the development of diets that can be provided by a BLSS incorporating *Closteriopsis acicularis*. Author

**N86-15892#** Joint Publications Research Service, Arlington, Va.  
**INVESTIGATION OF MINERAL NUTRITION OF A NEW FORM OF MICROALGAE TO BE USED IN BIOLOGICAL LIFE-SUPPORT SYSTEMS**

M. A. LEVINSKIKH and O. G. LIVANSKAYA *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 149-151 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 95-96

Avail: NTIS HC A08

*Closteriopsis acicularis* var. *africana* Hind unicellular green algae attracted the attention of researchers because, unlike *Chlorella*, it has a readily broken down cell membrane and, according to preliminary data, its biomass contains considerable amounts of readily assimilated carbohydrates. It is felt that inclusion of this alga in the photoautotrophic part of a biological life-support system (BLSS) for man could optimize its features considerably. One of the main questions in studying unicellular algae as applied to human BLSS is their biogenic element requirements. Such knowledge is necessary in order to provide optimum mineral nutrition for algae and high productivity, but mainly to maintain these conditions on a specific level during continuous cultivation in the mode of medium recirculation, which requires constant replenishment of biogenic elements in strict accordance with their removal with the collected harvest. Data was obtained on biogenic element requirements of algae during accumulating cultivation under different cultivation conditions. B.W.

**N86-15893#** Joint Publications Research Service, Arlington, Va.  
**EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY**

9 Oct. 1985 73 p refs Transl. into ENGLISH from various East European articles

(JPRS-ESA-85-031) Avail: NTIS HC A4/MF A01

Progress in science and technology in East European countries is reported. Topics discussed include: German-Soviet joint training of electrical engineers, advanced process for metal glass which failed industrial adaptation, advances in radio biological research; advances in optoelectronic, nuclear reactor, radiobiological research.

**N86-15894#** Joint Publications Research Service, Arlington, Va.  
**ADVANCES IN RADIOBIOLOGICAL RESEARCH: HYPOXIC IRRADIATION EFFECTS**

A. M. DANCEWICZ and M. M. JELENSKA *In its* East Europe Report: Science and Technology (JPRS-ESA-85-031) p 7-13 9 Oct. 1985 refs Transl. into ENGLISH from Nukleonika (Warsaw, Poland), no. 7-8, 1982 p 377-386

Avail: NTIS HC A04/MF A01

The effect of hypoxic conditions during irradiation of rats with 9.0 Gy dose of X-rays determined in lung homogenate concentration of DNA, protein and collagen and the activity of cathepsin, beta-glucuronidase, acid phosphatase and plasminogen activator was studied. It was found that regardless of hypoxic conditions of irradiation, collagen content in rat lungs was increased with time after exposure. Hypoxic conditions resulted in partial decrease during later periods after exposure to other biochemical indices of irradiation. It is evident in the case of the fibrinolytic activity which in hypoxic rats is increased during first several days while in rats irradiated under normal conditions this increase persist for more than 1 year after exposure. E.A.K.

## 51 LIFE SCIENCES (GENERAL)

**N86-15895#** Joint Publications Research Service, Arlington, Va.  
**TRITIUM INGESTION IN RATS**

Z. PIETRZAK-FLIS and I. RADWAN *In its* East Europe Report: Science and Technology (JPRS-ESA-85-031) p 14-25 9 Oct. 1985 refs Transl. into ENGLISH from Nukeonika (Warsaw, Poland), v. 27, no. 7-8, 1982 p 389-403  
Avail: NTIS HC A04/MF A01

The effect of chronic ingestion of tritiated water and tritiated food on growth and reproduction of Wistar rats was evaluated. The animals were exposed during one or three successive generations. Ingestion of tritiated food caused higher reduction in sperm count than tritiated water. It is found that the effect of tritium on growth of rats and ability for sperm production depends on the absorbed dose and the form of ingested tritium. E.A.K.

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### AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

**A86-16753**

**HYPOXIC AND HYPERCAPNIC SENSITIVITY AS A REFLECTION OF INDIVIDUAL HUMAN REACTIVITY [CHUVSTIVITEL'NOST' K GIPOKSICHESKOMU I GIPERKAPNICHESKOMU STIMULU KAK OTRAZHENIE INDIVIDUAL'NOI REAKTIVNOSTI ORGANIZMA CHELOVEKA]**

T. V. SEREBROVSKAIA (AN USSR, Institut Fiziologii, Kiev, Ukrainian SSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1985, p. 65-69. In Russian. refs

Examinations of 64 boys aged 15 to 17 years showed that individuals having a lower threshold sensitivity to a hypercapnic stimulus and a larger ventilatory response also exhibited higher levels of ventilation and gas exchange at rest. The reaction of the respiratory system to a hypoxic gas mixture at an altitude of 3000 m was also found to be greater in individuals displaying high hypercapnic sensitivity. In addition, hypercapnic sensitivity was positively correlated with muscular exertion, skin sensitivity, and nervous mobility at high altitude. Correlative connections between hypoxic sensitivity and the above reactivity parameters were less marked. It is concluded that sensitivity to a hypercapnic stimulus, being a genetically fixed trait, can be used as a criterion for evaluating the individual reactivity of an organism. I.H.

**A86-17351**

**PRECISION AND ACCURACY OF OCULOCENTRIC DIRECTION FOR TARGETS OF DIFFERENT LUMINANCES**

H. E. BEDELL, M. H. JOHNSON, and R. BARBEITO (Houston, University, TX) Perception and Psychophysics (ISSN 0031-5117), vol. 38, no. 2, Aug. 1985, p. 135-140. refs  
(Contract NIH-EY-03694)

The precision and accuracy of specifying oculocentric directions were assessed by successively partitioning an 8.3 deg space in the right field into a series of perceptually equal fractional spaces and then matching each partitioning target's direction in the left field. Three observers performed this task for four target luminances, ranging from 0.04 to 43 cd/sq m. The results show that luminance has virtually no effect on either the precision or accuracy of spatial partitioning; essentially no effect was obtained even when, for one observer, target luminance was reduced to nearly the absolute threshold. These data are interpreted in terms of the role of oculocentric direction in mediating visual behaviors. Author

**A86-17918**

**LIKELIHOOD OF HIGH RATES OF ENERGY DEPOSITION IN THE HUMAN LEGS AT THE ANSI RECOMMENDED 3-30-MHZ RF SAFETY LEVELS**

OM. P. GANDHI, I. CHATTERJEE, D. WU, and Y.-G. GU (Utah, University, Salt Lake City) IEEE, Proceedings (ISSN 0018-9219), vol. 73, June 1985, p. 1145-1147. Navy-supported research. refs

(Contract F33615-83-R-0613)

Based on physical measurements, the letter provides estimates of currents in human subjects exposed to ANSI C95.1-1982 recommended safety levels for RF EM fields. It is shown that such fields are likely to result in high SARs in the leg with values as high as 182 W/kg for the frequency band 3-30 MHz. Author

**A86-18547**

**THE EFFECT OF +GZ ACCELERATION ON CARDIAC VOLUMES DETERMINED BY TWO-DIMENSIONAL ECHOCARDIOGRAPHY**

T. JENNINGS (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH), J. SEAWORTH, D. RATINO, L. TRIPP, L. HOWELL (USAF, Wright-Patterson Medical Center, Wright-Patterson AFB, OH) et al. SAFE Journal, vol. 15, Winter 1985, p. 4-9. refs

A 3.5 MHz transducer and a real-time, two-dimensional scanner are used to record four-chamber apical echocardiographs before, during, and after exposure to +Gz acceleration. Seven subjects were exposed to two acceleration profiles, +Gz ramp with a +1 Gz/10 second onset rate, and +3 Gz for 3 minutes, with and without G-suit inflation. Graphs displaying the hemodynamic changes for the two test conditions are presented. In both test conditions the heart position remains unchanged. At +1 Gz acceleration in the uninflated G-suit a decrease in end-diastolic volume and stroke volume is observed. The inflated G-suit countered this hemodynamic change; however, after 30 sec of +3 Gz acceleration the protective effect of the suit is no longer detected. I.F.

**A86-18548**

**INFLIGHT LOSS OF CONSCIOUSNESS. II**

D. C. JOHANSON (U.S. Naval Weapons Center, China Lake, CA) SAFE Journal, vol. 15, Winter 1985, p. 24-27. refs

An aviator's physiological responses to acceleration, which include cardiovascular reflexes maintaining sufficient blood flow, visual impairment, and loss of consciousness, are described; a graph depicting these responses is provided. The training of an aviator, by exposure, to handle the problems of acceleration is examined; the advantages and disadvantages of using an aircraft or a centrifuge are discussed. Centrifuge training permits the determination of a resting tolerance, multiple exposure, videotaping of training, and biofeedback; it proves to be more beneficial than actual aircraft exposure. I.F.

**A86-18831**

**ADDITIONAL PRESSURISATION FOR TREATING NONRESPONDING CASES OF SERIOUS AIR DECOMPRESSION SICKNESS**

D. R. LEITCH and R. D. GREEN (Institute of Naval Medicine, Gosport, England) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1139-1143. refs

Twenty years of decompression sickness (DCS) treatment records are reviewed in order to assess the treatment value of additional oxygen compression to 50 m (6.0 bar) or higher for cases which failed to respond satisfactorily to standard 5-h treatment of oxygen breathing at 18 m (2.8 bar). For cases with continuing strong symptoms of DCS, further compression to 50 m did not alter recovery. Similarly, compression beyond 50 m (to as deep as 76 m) failed to provide a benefit. Hemorrhage, thrombosis, or edema are suspected to be the cause of continuing deterioration in the nonresponding cases. Therefore, the need for maintenance of constant blood volume during hyperbaric oxygen treatment is emphasized. I.S.



**A86-18832****THE DESENSITISATION OF CHRONICALLY MOTION SICK AIRCREW IN THE ROYAL AIR FORCE**

M. BAGSHAW and J. R. R. STOTT (RAF, Institute of Aviation Medicine, Farnborough, England) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1144-1151. refs

The Royal Air Force Motion Sickness (MS) Desensitization Program (DP), in operation since 1966, consists of a ground phase (GPh) and an airborne phase (APh) of treatment. In the GPh, a vertical vibrating platform, operating at 0.3 Hz and 0.4 Hz, has been introduced in 1981 in addition to the standard cross-coupled, sinusoidal linear Gz and angular oscillation. In the APh of the DP, the basic jet trainer has been replaced by a Hunter T7 jet which allows a graded build-up of MS stimuli from straight flight to advanced aerobatics and high-speed, low-level navigation. Both changes have improved the overall success rate, with the flying phase shown to be the most important component of the treatment. Tolerance might be partially lost after a long break in flying, but is regained after a short period of the therapy, indicating that adaptation may be retained for longer periods than was previously suspected. I.S.

**A86-18834\*** National Aeronautics and Space Administration. Johnson (Lyndon B.) Space Center,  
**ENDOCRINE CORRELATES OF SUSCEPTIBILITY TO MOTION SICKNESS**

R. L. KOHL (NASA, Johnson Space Center; Universities Space Research Association, Houston, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1158-1165. refs

Motion sickness releases ACTH, epinephrine, and norepinephrine. The endocrine responses to motion sickness, adaptive responses leading to the resolution of the syndrome, and the way in which antimotion-sickness drugs influence the endocrine responses were studied. Susceptible or insusceptible subjects were administered antimotion-sickness drugs prior to stressful stimulation. Insusceptible subjects displayed more pronounced elevations of ACTH, epinephrine, and norepinephrine after stressful motion. Predrug levels of ACTH were higher in insusceptible subjects ( $p$  less than 0.01). Acute blockade of hormone responses to stressful motion or alteration of levels of ACTH by drugs were not correlated with individual susceptibility. No correlation was apparent between epinephrine and ACTH release. These endocrine differences may represent neurochemical markers for susceptibility to motion, stress, or general adaptability, and it may be that the chronic modulation of their levels might be more effective in preventing motion sickness than the acute blockade or stimulation of specific receptors. Author

**A86-18835****PLASMA NOREPINEPHRINE, BLOOD PRESSURE AND HEART RATE RESPONSE TO GRADED CHANGE IN BODY POSITION**

V. FIORICA (USVA, Medical Center, Muskogee; Tulsa Medical College, OK) and D. C. KEM (Oklahoma, University, Oklahoma City) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1166-1171. refs

The effect of either an abrupt orthostatic postural change (supine to stand) or a graded change in a head-up body position on a tilt table (0, 20, 40, and 80 deg) on the levels of systolic (SBP) and mean (MBP) blood pressure, the heart rate (HR), and plasma norepinephrine (NE) concentrations was studied on 44 human subjects aged 21-41. Neither postural maneuver caused a significant change in either SBP or MBP. On the other hand, both the HR and NE showed significant increases due to the orthostatic maneuver, and both of these parameters responded with linear proportionality to the increasing degree of tilt. A significant correlation between plasma NE and HR was observed during both positional change maneuvers (orthostatic,  $r = 0.50$ ; graded tilt table,  $r = 0.80$ ), indicating that in the conditions of postural change, plasma NE concentrations reflect the activation level of the sympathetic nervous system. I.S.

**A86-18836****HEMODYNAMIC RESPONSES TO UPRIGHT TILT AT SEA LEVEL AND HIGH ALTITUDE**

C. S. FULCO, A. CYMERMAN, P. B. ROCK, and G. FARESE (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1172-1176. refs

The effect of a head-up tilt (HUT) (13 min at 60 deg, following 16 min in the supine position) was studied in 8 men (age 21.6 yr) at sea level (SL); after 1 h at 4300 m simulated altitude; and at 18, 66, and 114 h during residence at 4300 m altitude (HA). Changes in heart rate (HR), stroke volume (SV), cardiac output (CO), calf blood flow (CBF), blood pressure (BP), total peripheral resistance (TPR), and plasma norepinephrine (NE) were measured to monitor the effects of positional and altitude changes. After transfer from the SL to HA, the supine values of HR, TPR, BP and NE were increased, while the values of SV, CO, and CBF were reduced. The HUT values of HR and mean BP have also increased after 18 h at HA, but the levels of other parameters measured in the HUT position showed little change from the SL values. Thus, with prolonged exposure to HA (66 to 114 h), the SV, CO, TPR, and CBF responses to tilt were reduced. I.S.

**A86-18837****IMMERSION COOLING - EFFECT OF CLOTHING AND SKINFOLD THICKNESS**

S. A. NUNNELEY (USAF, School of Aerospace Medicine, Brooks AFB, TX), E. H. WISSLER (Texas, University, Austin), and J. R. ALLAN (Institute of Aviation Medicine, Farnborough, England) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1177-1182. refs

Accidental immersion often involves the threat of death due to hypothermia. Clothing to control heat loss in water is generally selected to minimize bulk while providing the necessary protection. While water temperature,  $T(W)$ , and possible immersion time are often considered, another relevant variable is the insulation provided by subcutaneous fat. This paper describes the use of a sophisticated computer model to explore the interactions among skinfold thickness (6-20 mm mean weighted value), clothing insulation (0.06-0.23 immersed), and  $T(W)$  (0-20 C), in producing critical hypothermia (arterial temperature equal to or less than 34 C). Results indicate that subcutaneous fat strongly affects heat loss even with heavy clothing. Discussion includes examples of the possible use of skinfold data to improve specification of protective clothing for groups and allow special clothing prescription for individuals. Author

**A86-18838****EFFECTS OF PSYCHOTROPIC DRUGS ON THERMAL RESPONSES TO RADIOFREQUENCY RADIATION**

J. R. JAUCHEM, M. R. FREI, and F. HEINMETS (Technology, Inc., Life Sciences Div.; Trinity University, San Antonio, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1183-1188. refs  
(Contract F33615-80-C-0614)

The effect of chlorpromazine (C), amitriptyline (A), and haloperidol (H) on thermal responses in anesthetized rats during three cycles of exposure to 2.8 GHz radiofrequency radiation was investigated by measuring the time required for the colonic temperature to rise from 38.5 to 39.5 C (rise time) during the exposure and return to 38.5 C (recovery time) after exposure was discontinued. In comparison with the untreated and saline-treated animals, the rats injected with C (5 mg/kg) exhibited increased rise time during the radiation exposure and a faster recovery (decreased recovery time). Neither A (10 mg/kg) or H (0.1 mg/kg) affected thermal response. The results indicate that acute administration of C can counteract mild hyperthermia during intermittent exposure to radiofrequency radiation. I.S.

A86-18839

**ANALYSES OF MAXIMUM CARDIOPULMONARY PERFORMANCE DURING EXPOSURE TO ACUTE HYPOXIA AT SIMULATED ALTITUDE - SEA LEVEL TO 5000 METERS (760-404 MM HG)**

H. T. ANDERSEN, E. B. SMELAND, J. O. OWE, and K. MYHRE (Institute of Aviation Medicine, Oslo, Norway) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1192-1197. refs

A86-18844

**HYPOXIA-INDUCED VASOPRESSIN RELEASE AND COAGULOPATHY IN A NORMAL SUBJECT**

M. ANDREW, H. OBRODOVICH, G. COATES (McMaster University, Hamilton, Canada), G. L. ROBERTSON (Chicago, University, IL), and G. W. GRAY (Defence and Civil Institute of Environmental Medicine, Downsview, Canada) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1220-1223. Sponsorship: Medical Research Council of Canada. refs (Contract MRC-MA-7595)

This case report describes an apparently normal subject who developed marked qualitative and quantitative changes in all components of the factor VIII complex while inhaling an 11 percent oxygen/balance nitrogen gas mixture for 2 h. Blood from fresh venepunctures was drawn at baseline, during and after exposure to hypoxia for the following: a partial thromboplastin time, a prothrombin time, fibrin monomer, factor VIII:C, VIII procoagulant antigen (VIII:CAG); ristocetin cofactor activity (VIII:R:Co); VIII von Willebrand factor (VIII:vWF) multimer pattern; and arginine vasopressin. During hypoxia VIII:C, VIII:CAG, VIII:R:Ag and VIII:R:Co increased 4 to 5 fold; the VIII:vWF multimer pattern showed increasing low molecular weight complexes, fibrin monomer appeared and arginine vasopressin (AVP) levels increased from 5.5 pg/ml to 73.8 pg/ml. These changes are compatible with both the release of the VIII:R:Ag by AVP and protease induced fragmentation of the VIII complex. Author

A86-18845

**WEARING CONTACT LENSES IN SPACE SHUTTLE OPERATIONS**

L. G. HART Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1224, 1225. refs

More and more mission specialists are being trained to operate in the Space Shuttle and to eventually maintain a permanent station in space. Since up to 48 percent of the general population wears a visual correction of some sort, it is logical to assume that this percentage will also be found in the astronaut population. This paper proposes that the soft contact lens can be worn successfully in the space environment. The contact lens of choice is the continuous-wear soft contact lens which is proving to be quite successful for the general public. These lenses must be fitted at least 6 months before space flight in order to make sure they can be worn successfully. Author

**N86-14849# Joint Publications Research Service, Arlington, Va. HYGENIC ASPECTS OF REGULAR DIET OF FLIGHT PERSONNEL**

I. G. POPOV In its USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 1-21 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 4-19 Avail: NTIS HC A07

The nutritional approaches to daily meals for the flying personnel while on the ground are discussed from a historical point of view. It is indicated that the nutrition requirements for the chemical composition of the daily diet are related to the physiological norms accepted by the food science in the USSR and other countries at various stages of its development. It is shown that the present-day diets for the flying personnel have a high caloric value. The basic physiological and nutritional requirements for the daily diets are given. E.A.K.

**N86-14850# Joint Publications Research Service, Arlington, Va. METABOLIC DISTINCTIONS OF HUMAN RED BLOOD DURING LONG-TERM SPACEFLIGHTS**

A. S. USHAKOV, S. M. IVANOVA, F. I. ATAULLAKHANOV, A. V. PICHUGIN, Y. I. DUBINSKAYA, S. S. BRANTOVA, O. I. LABETSKAYA, V. P. NAYDINA, and A. Y. ZEZEROV In its USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 22-26 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 19-23 Avail: NTIS HC A07

Before and after the 150-day Salyut-7 flight the crewmembers were examined for their red blood cell metabolism: major metabolic pathways (glycolytic and pentosophosphate), erythrocyte resistance, membrane permeability and lipid peroxidation rate. It is indicated that the metabolic and membrane changes are not pathological and can be classified as adaptive. E.A.K.

**N86-14851# Joint Publications Research Service, Arlington, Va. HUMAN BODY BIOMECHANICS AND MOVEMENTS AFTER 120-DAY ANTIORTHOSTATIC HYPOKINESIA**

V. M. ZATSIORSKIY, M. G. SIROTA, B. I. PRILUTSKIY, L. M. RAYTSIN, V. N. SELUYANOV, and L. G. CHUGUNOVA In its USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 27-32 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 23-27 Avail: NTIS HC A07

Data on body parameters (weight and circumference) and walking biomechanics after 120-day head-down tilt are presented. The exposure leads to changes in the antigravitational muscles which are assumed to be caused by relative changes in the fat and muscle components. Head-down tilt produces changes in the kinematic parameters of the walking process, the shape of support reactions, and losses in the walking efficiency. E.A.K.

**N86-14852# Joint Publications Research Service, Arlington, Va. FUNCTIONAL ACTIVITY OF HUMAN SEROTONINERGIC AND HISTAMINERGIC SYSTEMS DURING LONG-TERM ANTIORTHOSTATIC HYPOKINESIA**

N. A. DAVYDOVA, Y. Y. GALKINA, and A. S. USHAKOV In its USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 33-37 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 27-30 Avail: NTIS HC A07

The functional activity of serotonin and histaminergic systems was investigated during 120-day head-down tilt. Serotonin excretion was increased until test day 70 and histamine excretion throughout the entire study. At the final stage of exposure the serotonin content decreased. Return to the normal motor activity stimulated the function of serotonin and histaminergic systems. E.A.K.

**N86-14853# Joint Publications Research Service, Arlington, Va. BODY POSITION DURING HYPOKINESIA, AND FLUID-ELECTROLYTE METABOLISM**

V. B. NOSKOV, G. I. KOZYREVSKAYA, B. V. MORUKOV, Y. M. ARTAMASOVA, and L. A. RUSTAMYAN In its USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 38-43 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 31-34 Avail: NTIS HC A07

Two groups of five healthy volunteers each were exposed for 7 days to: (1) group 1 to horizontal bed rest and (2) group 2 to head-down tilt at -6 deg. The effect of body position on fluid-electrolyte metabolism and renal function was determined. During the control period, bed rest and the recovery period the consumption of fluids and mineral substances and their renal

excretion were measured. The typical changes in fluid-electrolyte metabolism during head-down tilt developed faster than during horizontal bed rest. The fluid-electrolyte balance became negative in the course of the exposure and returned to normal during the recovery period. The group 2 subjects showed greater body weight losses due to both fluid and muscle mass losses. E.A.K.

**N86-14854#** Joint Publications Research Service, Arlington, Va. **MICROCIRCULATION AND CELLULAR HEMOSTASIS IN MEN WITH BORDERLINE ARTERIAL HYPERTENSION SUBMITTED TO NEUTRAL-TEMPERATURE DRY IMMERSION IN WATER** L. L. KIRICHENKO, V. V. SMIRNOV, and A. G. YEVDOKIMOV *In its USSR Report: Space Biology and Aerospace Medicine*, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 44-49 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina* (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 35-38 Avail: NTIS HC A07

Platelet hemostasis, microcirculation, blood viscosity and lipid metabolism were examined in 18 men with borderline hypertension and 8 healthy men before, during and after 7-day immersion. The exposure to thermoneutral dry water immersion produced hypercoagulopathic changes of platelet hemostasis in the healthy and hypertensive subjects. Platelet hemostasis returned to the pretest level in the subjects in 2 days and in the hypertensive subjects in 5 days after exposure. Prior to immersion the hypertensive subjects showed signs of capillarotrophic insufficiency which increased after exposure. On immersion day 3 the hypertensive subjects exhibited a higher blood viscosity and a larger content of total lipids and free fatty acids. E.A.K.

**N86-14855#** Joint Publications Research Service, Arlington, Va. **EFFECT OF POSITIVE PRESSURE BREATHING ON HEMODYNAMICS IN PATIENTS WITH BORDERLINE HYPERTENSION SUBMITTED TO WATER IMMERSION** V. N. ORLOV, I. O. FOMIN, A. E. RADZEVICH, and G. S. LESKIN *In its USSR Report: Space Biology and Aerospace Medicine*, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 50-53 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina* (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 39-41 Avail: NTIS HC A07

Patients with borderline hypertension were exposed, during immersion, to positive pressure breathing. During exposure cardiac output (CO), heart rate (HR), mean arterial pressure (MAP), total peripheral resistance (TPR), left ventricle work (W), blood content of head vessels (Qh), upper and lower lung lobes (Qul and Qll), liver (Ql) were measured. During immersion, CO and MAP decreased, HR and TPR increased slightly, and W diminished. Simultaneously, Qh, Qul and Qll increased significantly while Ql decreased considerably, indicating blood centralization during simulated microgravity. Courses of positive pressure breathing led to decreases in Qh, Qul, Qll and increase in Ql, i.e., they caused blood to be displaced from the head and lungs to the liver. It is concluded that the liver plays the role of a physiological pool which accumulates blood removed from the upper body by positive pressure. E.A.K.

**N86-14859#** Joint Publications Research Service, Arlington, Va. **HEMODYNAMIC PARAMETERS AS RELATED TO DIFFERENT TOLERANCE TO HEAD-PELVIS ACCELERATIONS** N. I. KOKOVA *In its USSR Report: Space Biology and Aerospace Medicine*, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 75-80 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina* (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 56-60 Avail: NTIS HC A07

Hemodynamic parameters in the subjects with various resistance to +Gz acceleration were investigated. The acceleration value was increased slowly. During centrifugation ECG, systolic pressure in the ear lobe, stroke volume and cardiac output were measured. In the resistant subjects stroke volume remained stable and cardiac output was close to or higher than the initial level. In

the nonresistant subjects both parameters decreased although their heartrate was significantly higher than in the resistant subjects. Various visual disorders developed when cardiac output decreased by 50 to 70% as compared to the initial level. It is concluded that in the nonresistant people the compensatory mechanisms responsible for the stability of cardiac output include primarily HR increase, whereas in the resistant people they involve a high level of venous return and stroke volume. E.A.K.

**N86-14860#** Joint Publications Research Service, Arlington, Va. **CHANGES IN PHYSICO-CHEMICAL PROPERTIES OF CONTRACTILE AND REGULATORY PROTEINS IN DIFFERENT TYPES OF MUSCLES DURING AND AFTER EXPOSURE TO ACCELERATIONS** B. A. TIKUNOV, M. A. KAYFADZHYAN, and S. S. OGANESYAN *In its USSR Report: Space Biology and Aerospace Medicine*, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 81-86 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina* (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 60-64 Avail: NTIS HC A07

After 15-day exposure to +5 Gx the rate of superprecipitation, Mg<sup>2+</sup>-ATPase activity and actomyosin ATPase of slow muscles of white rats increased greatly. In actomyosin of fast muscles the exposure induced weaker and opposite changes in the superprecipitation rate and Mg<sup>2+</sup>-ATPase activity. The changes in actomyosin of the fast muscles were associated with shifts only in regulatory components while those of the slow muscle were produced by shifts in contractile proteins as well. This provided for a better recovery of the initial value of the superprecipitation rate and Mg<sup>2+</sup>-ATPase activity of actomyosin of the fast muscles a month after exposure. E.A.K.

**N86-14861#** Joint Publications Research Service, Arlington, Va. **CUMULATIVE EFFECT OF CORIOLIS ACCELERATIONS ON CORONARY HEMODYNAMICS** E. V. LAPAYEV and V. S. BEDNENKO *In its USSR Report: Space Biology and Aerospace Medicine*, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 87-92 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina* (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 64-68 Avail: NTIS HC A07

Time-course variations in coronary circulation and cardiac output were measured in 29 healthy test subjects who performed tests with a continuous cumulation of Coriolis accelerations and in 12 healthy test subjects who were exposed to Coriolis accelerations combined with acute hypoxia. Adaptive changes in coronary circulation were seen. It is recommended to monitor coronary circulation during vestibulometric tests as part of medical examination of flying personnel. E.A.K.

**N86-14862#** Joint Publications Research Service, Arlington, Va. **NYSTAGMUS AS RELATED TO UTRICULAR FUNCTION** Y. K. STOLBKOV *In its USSR Report: Space Biology and Aerospace Medicine*, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 93-98 25 Nov. 1985 refs Transl. into ENGLISH from *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina* (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 68-72 Avail: NTIS HC A07

The horizontal neck nystagmus arising in response to angular acceleration as recorded electromyographically in pigeons. After bilateral section of the utricular nerves (Ramuli utriculi) the nyctagmic reactions to the right and to the left remained symmetrical although they were delayed when compared to the reactions of intact animals. Unilateral section of the utricular nerves caused asymmetric reactions from the semi-circular canals; the nystagmus toward the dissected nerve was delayed to a greater extent than that toward the intact nerve. E.A.K.

**N86-14863# Joint Publications Research Service, Arlington, Va. INDIVIDUAL DIFFERENCES IN MAXIMUM OXYGEN UPTAKE REGULATION AND LEVEL**

V. S. GOROZHANIN *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 99-105 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 72-77  
 Avail: NTIS HC A07

Neuronal and hormonal mechanisms responsible for the differences in the maximum oxygen consumption are discussed. The subjects with electroencephalographic and sensory signs of stimulating reticular-hypothalamic-amygdalic effects balanced with inhibitory cortical-striatal-septic-hippocampal-epiphyseal effects showed a high oxygen consumption, moderate excretion of epinephrine and norepinephrine, moderate plasma concentrations of ACTH, cortisol, total and free 11-OHCS and insulin, relatively high concentrations of STH, and specific dynamics of hormonal and metabolic reactions to aerobic effects. They included a moderate increase of the excretion of dopamine, DOPA and plasma concentrations of ACTH, a comparatively stable level of cortisol, total and free 11-OHCS, drastic increases of norepinephrine excretion and STH, lactate and pyruvate concentrations, a moderate decrease of insulin and pH levels. The subjects with high hypothalamic-reticular-amygdalic effects exhibited an opposite type of endocrine activity and time-course variations of hormonal-metabolic parameters, as well as low values of oxygen consumption. E.A.K.

**N86-14864# Joint Publications Research Service, Arlington, Va. SIGNIFICANCE OF VESTIBULAR RECRUITMENT AND DIRECTIONAL DOMINANCE OF NYSTAGMUS IN DIAGNOSTIC TESTS**

M. M. LEVASHOV *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 106-111 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 78-81  
 Avail: NTIS HC A07

Vestibular recruitment (VR), a phenomenon of impairment of vestibular nystagmus as a proportionate function of force of stimulus, is of diagnostic interest for the pathology of the ear. There is still no generally accepted opinion about the mechanisms of its onset, there is no uniformity of techniques for its detection and quantitative evaluation and terminology. The conceptions of mechanisms and potential relevance of this phenomenon to applied vestibulometry, which was developed on experience with nystagmometric investigations, is presented. E.A.K.

**N86-14867# Joint Publications Research Service, Arlington, Va. AGE-RELATED CHANGES IN ELECTROENCEPHALOGRAMS OF PILOTS**

E. MARKS, W. ZUZEVIC, E. DWOREZKI, and M. MAZENSKI *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 120-122 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 85-86  
 Avail: NTIS HC A07

An age related changes in electroencephalograms of pilots study was conducted in two stages. At the first stage a visual and statistical analysis of 343 EEG of 125 pilots; at the second, pilots of two age groups were screened: the average age of individuals in the first group was 24.7 years and in the 2d group, 43.8 years. Evoked potentials (EP) matched in response to photic stimuli was used. The average age at the start of EEG observation was 25.1 + or - 5.5 years and at the end, 43.6 + or - 4.6 years. Regularity of alpha rhythm on the EEG, mean frequency of basic rhythm, mean amplitude, reaction delay, activation of EEG by hyperventilation and light flashes (stroboscope) correlation between slow waves, frequency and amplitude of basic rhythm, correlation between EEG and clinical parameters are analyzed. A specially

developed chart to analyze the EEG and the criteria of Student, Shapiro-Wilke and X2 in statistical processing are used. E.A.K.

**N86-14871# Joint Publications Research Service, Arlington, Va. COMBINED EFFECTS OF STRESSORS ON THE LEVEL OF SPINAL REFLEX ARC STRUCTURES**

F. I. FURDUI, S. K. KHAYDARLIU, and L. M. MAMALYGA *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, No. 5, September - October 1985 (JPRS-USB-85-007) p 135-140 25 Nov. 1985 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow), v. 19, no. 5, Sep. - Oct. 1985 p 92-95  
 Avail: NTIS HC A07

Long-term restriction of motor activity alters appreciably the motor analyzer, including the spinal reflex arc which is the peripheral element of the central nervous system in effecting interaction between the body and environment. The initial period of hypokinesia differs appreciably from the subsequent period of adaptation and is associated in animals with the release reaction and occurs in the presence of a marked stress reaction leading to stressed function of the central nervous system and most other systems of the body. Hypoxia is the most frequent companion of hypokinesia, together with other extreme environmental factors. No data concerning the combined effects of various stressors on the level of the spinal reflex arc are available. The morphological and cytochemical changes in cellular structures of spinal cord ganglia (SCG) and motoneurons of the ventrolateral nucleus (VLN) of the spinal cord on the level of the lumbar and cervical spine under the separate and combined effect of stressors are studied. E.A.K.

**N86-14872# David Sarnoff Research Center, Princeton, N.J. PORTABLE DIAGNOSTIC RADIOMETER Final Report, 1 Oct. 1983 - 30 Jun. 1984**

Jul. 1985 68 p  
 (Contract N00014-83-C-0524)  
 (AD-A157685) Avail: NTIS HC A04/MF A01 CSCL 06E

There exists a need for a portable diagnostic instrument that can noninvasively monitor and display internal body temperatures. This instrument would be extremely important on U.S. Navy ships whose complement does not include the services of competent medical professionals. In this case it would be important to determine whether a particular medical emergency does or does not exist in a patient. This would determine whether the patient should or should not be evacuated to a suitable medical facility for treatment. The instrument would determine, by radiometric means, whether particular organs exhibit an elevated temperature. For example, this may be an aid in the diagnosis of appendicitis or nephritis. The instrument described in this report is a dual-frequency microwave radiometer. The radiometer measures the amount of noise power being radiated from a localized tissue volume on the patient. The amplitude of this noise power over a frequency spectrum determined by the microwave components is proportional to the average temperature of the volume in question. Making this measurement at two separate frequencies can give an indication of the temperature profile over a depth as great as 6 cm. Author (GRA)

**N86-14873# Wisconsin Univ., Madison. PULMONARY ADAPTATION TO HIGH ALTITUDE Semiannual Progress Report, Dec. 1984 - Jun. 1985**

J. A. DEMPSEY Jun. 1985 8 p  
 (Contract DAMD17-82-C-2259; DAMD17-77-C-7006)  
 (AD-A157694) Avail: NTIS HC A02/MF A01 CSCL 06S

Three major aims of the contract were addressed in the past 6 months: (1) We completed our study of the relationship between hypoxia-induced periodic breathing in sleep and the occurrence of obstructive apnea. (2) The question of respiratory muscle fatigue during exercise in humans was studied in highly fit subjects performing high intensity exercise to exhaustion. (3) We have studied respiratory muscle recruitment during exercise and saw evidence of active expiration even in mild exercise. GRA

**N86-14874#** National Council on Radiation Protection and Measurements, Bethesda, Md.

**STUDIES CONCERNED WITH BASIC RADIATION PROTECTION CRITERIA AND STUDIES CONCERNED WITH GUIDANCE AND INFORMATION**

24 Jul. 1985 6 p

(Contract N00014-84-C-0776)

(AD-A158319) Avail: NTIS HC A02/MF A01 CSCL 06R

Scientific Committee 1 is a standing committee of the NCRP charged with the formulation of basic radiation protection criteria. The Committee is actively engaged in the development of a radiation protection system based on risk. The average annual risk of mortality associated with employment in safe industries is being used by the Committee as the guideline for developing recommendations for the maximum annual risk of mortality for occupational radiation exposure. Levels of risk associated with external whole body exposure, partial body exposure, internal exposure and the methodology for the summation of these risks are also being addressed by the Committee. The Committee plans to draft four reports over the next few years. These will cover: (1) exposure limits, (2) the philosophical basis of a radiation protection system based on risk, (3) site-specific risk coefficients, and (4) implementation of a radiation protection system based on risk. The report on exposure limits, Recommendations On Exposure Limits, will enter the Council's review process during the summer of 1985. GRA

**N86-14875#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**CIRCULATORY AND THERMOREGULATORY ACTIONS OF HYDRATION DURING EXERCISE-HEAT STRESS**

M. N. SAWKA, R. P. FRANCESCONI, and K. B. PANDOLF Aug. 1985 14 p

(Contract DA PROJ. 3E1-62777-A-879)

(AD-A158440; USARIEM-M36/85) Avail: NTIS HC A02/MF A01 CSCL 06S

During exercise in the heat, sweat output often exceeds water intake resulting in hypohydration. Hypohydration during exercise causes a greater heat storage and reduces endurance in comparison with euhydration levels. The greater heat storage is attributed to a decreased sweating rate as well as decreased cutaneous blood flow. These response decrements are attributed to both plasma hyperosmolality and plasma hypovolemia. In addition, plasma hypovolemia will result in a reduced cardiac output response, relative to euhydration, during exercise-heat stress. Hyperhydration, or body fluid excess, only provides the advantage of delaying the onset of hypohydration. Author (GRA)

**N86-14876#** School of Aerospace Medicine, Brooks AFB, Tex. **FOODBORNE AND WATERBORNE DISEASE OUTBREAKS. A COMPILATION AND SUBJECTIVE PROFILE Final Report, Jan. 1977 - Jun. 1983**

T. V. MURPHY Jul. 1985 26 p

(AD-A158536; USAFSAM-TR-85-28) Avail: NTIS HC A03/MF A01 CSCL 06E

This paper provides the epidemiologic field with a single source of information about many confirmed foodborne and waterborne disease outbreaks for each of five common bacterial etiologies: *Staphylococcus aureus*, *Salmonella*, *Shigella*, *Clostridium perfringens*, and *Vibrio parahaemolyticus*. The paper also evaluate traditional methods of outbreak reporting and suggest that an investigator might apply information of past outbreaks to help form an initial, presumptive diagnosis of a most probable etiologic agent in a current outbreak. GRA

**N86-14877#** Borriston Research Labs, Inc. Temple Hills, Md. **DEVELOPMENT OF VACCINES TO THE MYCOTOXIN T-2 Final Report, 16 May 1983 - 15 Feb. 1985**

V. MANOHAR 15 Mar. 1985 16 p

(Contract N00014-83-C-0441)

(AD-A158544; FR-1) Avail: NTIS HC A02/MF A01 CSCL 06E

An ELIAS System to detect and titer antibody to Mycotoxin T-2 was standardized. A new rapid simple method of making T-2

hemisuccinate (T-2-HS) was developed. The merit of the new method over the existing one accounts for its simple, less time-consuming procedure, which can be carried out at room temperature, with as high a yield of 66%. T-2-HS so developed was conjugated to derivatised sepharose-4B beads to make a column to affinity purify the antibody to Mycotoxin T-2. Polyclonal antisera to T-2 toxin was produced by immunizing rats and mice with T-2-HS coupled to KLH, goat antimouse IgG and monoclonal antimouse IgD. Affinity purified antibody to T-2 was employed in immunizing mice for the development of anti-idiotypic antibodies. Initially syngeneic immunization were carried out in Balb/c mice. Protective role anti-T-2 antibodies upon passive transfer, was examined. Both monoclonal and polyclonal antibodies to T-2, were found to neutralize T-2 toxin in vitro. Upon passive transfer to skin intradermally, inhibition of skin necrotization effect due to T-2 toxin was demonstrated, suggesting, role of an effective antidote. Protective immunity to in vivo exposure to T-2 toxin, upon active immunization with T-2-HS was also examined. Skin necrotization effect of T-2 toxin was completely inhibited in immune rats. However, the in vivo effect of Oral T-2 toxin, as measured by leucopenia in actively immunized rats, was not dramatically significant. GRA

**N86-14878#** Washington Univ., St. Louis, Mo. Dept. of Electrical Engineering.

**CELLULAR EFFECTS OF ELECTROMAGNETIC RADIATION Final Technical Report, 1 Feb. - 31 Jul. 1985**

W. F. PICKARD 16 Aug. 1985 11 p

(Contract N00014-82-K-0261)

(AD-A158547) Avail: NTIS HC A02/MF A01 CSCL 06R

Giant cells of characean algae were examined for electrophysiological sequelae to acute electromagnetic field irradiation at 10 mW/per sq cm. Carrier frequencies ranged from 50 MHz to 12.4 GHz and a variety of modulation protocols were employed. No effects were detected at this power level. GRA

**N86-14879#** Naval Health Research Center, San Diego, Calif. **BENZODIAZEPINE ACTIVITY: DAYTIME EFFECTS AND THE SLEEP EEG Interim Report, Sep. 1978 - Jun. 1984**

L. C. JOHNSON and C. L. SPINWEBER 22 Aug. 1984 19 p

(AD-A158702; NAVHLTHRSCHC-84-33) Avail: NTIS HC A02/MF A01 CSCL 06O

In this paper we review the effects of benzodiazepine hypnotics on the structure of sleep, arousal threshold during sleep, and the impact of bedtime hypnotic use on next-day performance. We also describe the effects of discontinuation of use of long and short half-life sedative-hypnotics. Results indicate that the half-life of benzodiazepine hypnotics is not the best predictor of next-day performance effects, arousal threshold effects, or the nature of EEG changes during sleep. Other pharmacokinetic properties, such as volume of distribution, must also be considered. Long and short half-life benzodiazepines both may produce a rebound insomnia, although the time of occurrence seems to differ. The marked individual differences in response to similar drug plasma levels plus processes of tolerance and adaptation limit the probability that significant correlations during chronic use. Dose level is the best predictor of next-day effects, and so, the smallest effective dose should be described. GRA

**N86-14880#** Behavioral Research Associates, West Lafayette, Ind.,

**BIOCYBERNETIC ANALYSIS OF A HYBRID WORKLOAD MODEL Final Report, 30 Sep. 1984 - 30 Mar. 1985 on Phase 1**

B. H. KANTOWITZ May 1985 40 p

(Contract F49620-84-C-0116)

(AD-A159033; BRA-85-10; AFOSR-85-0661TR) Avail: NTIS HC A03/MF A01 CSCL 05J

Biocybernetic measures - heart rate inter-beat interval (IBI) and event-related brain potential (ERP) - were used to provide converging operations to refine a hybrid model of attention and workload. Two experiments using the psychological refractory period paradigm were conducted with stimulus-response uncertainty and inter-stimulus interval (ISI) as manipulations of workload.

Reaction time was influenced by uncertainty and ISI; IBI standard deviation and spectral data were influenced by uncertainty; preliminary analysis of ERP showed N200 amplitude to be influenced by uncertainty and ISI. These results were related to a hybrid processing model formulated by Kantowitz and Knight (1976). GRA

**N86-14881#** Letterman Army Inst. of Research, San Francisco, Calif.

**A MULTI-ISOTOPE PROCEDURE FOR SIMULTANEOUSLY ESTIMATING THE VOLUME OF BODY FLUID COMPARTMENTS OF SWINE** Report, for Jan. 1983 - May 1985

C. A. BOSSONE and J. P. HANNON Jun. 1985 64 p  
(Contract DA PROJ. 3M1-61102-BS-10)  
(AD-A159631; LAIR-201) Avail: NTIS HC A04/MF A01 CSCI  
06P

The purpose of the studies reported in this paper was to develop isotope-based procedures to measure plasma volume, red cell volume, extracellular fluid volume, and total body water individually. Subsequently, techniques would be developed to use a combination of these procedures to measure some or all of the fluid spaces in the pig simultaneously. A procedure was developed for simultaneously estimating the volume of all major body fluid compartments. Splenectomized pigs, 20 to 25 kg, with chronically-implanted carotid artery catheters, received a bolus injection (per kg) (1 uCi 125 I-albumin, 11.7 uCi 51Cr-EDTA, 0.6 uCi 22Na, and 5.3 uCi 3H<sub>2</sub>O) followed by a 5.2 uCi ml/kg injection of 51 Cr-tagged red cells. Estimated lean body mass averaged 822 g/kg and body fat, 178 g/kg. The new procedure was rapid, technically simple, required small amounts of blood and was applicable to conscious animals. GRA

**N86-14882#** Oak Ridge National Lab., Tenn.

**NEUTRON EFFECTS IN HUMANS: PROTECTION CONSIDERATIONS**

R. J. FRY 1985 18 p refs Presented at the Workshop on Neutron Therapy: Low Dose Rate and Beam Radiation Therapy, Lexington, Ky., 24 Apr. 1985  
(Contract DE-AC05-84OR-21400)  
(DE85-015047; CONF-850453-2) Avail: NTIS HC A02/MF A01

Committee I of the International Commission on Radiological Protection has recommended that the Quality Factor for neutrons should be changed from 10 to 20. This article is an interesting recount of the tale of Q from the viewpoint of an observer which illustrates many of the problems that the selection of protection standards pose. DOE

**N86-14883#** Lawrence Livermore National Lab., Calif.

**VARIATION IN BASELINE SISTER CHROMATID EXCHANGE FREQUENCIES IN HUMANS**

A. V. CARRANO, L. K. ASHWORTH, J. L. MINKLER, and D. H. MOORE, II 18 Jun. 1985 7 p refs Presented at the 4th International Conference on Environmental Mutagens, Stockholm, 24 Jun. 1985  
(Contract W-7405-ENG-48)  
(DE85-016084; UCRL-92836; CONF-8506137-9) Avail: NTIS  
HC A02/MF A01

The lymphocyte is a surrogate cell that is routinely used to measure sister chromatid exchange (SCE) frequencies in humans. Our interests have focused on identifying sources of variability in human lymphocyte SCE frequencies, quantifying the magnitude of the variation, and understanding how it might affect the interpretation of data from mutagen-exposed groups. We have measured lymphocyte SCE frequencies in more than 900 blood samples from over 500 individuals. DOE

**N86-14884#** Fondazione Ugo Bordoni, Rome (Italy).

**REDUCTION OF SUBJECTIVE REDUNDANCY IN IMAGE SIGNALS: RESULTS OBTAINED AND RESEARCH TRENDS [RIDUZIONE DI RIDONDANZA SOGGETTIVA NEI SEGNALI DI IMMAGINE: RISULTATI OTTENUTI A LINEAMENTI DI RICERCA FUTURA]**

G. DIBLASIO Dec. 1984 35 p refs In ITALIAN  
(FUB-24-1984) Avail: NTIS HC A03/MF A01

The structure and the functions of the human visual system are studied in order to improve the compression of image signals without significative quality loss. A rate of up to 100 is considered the long range goal. Filtering structures defined as hypercomplexes are described. These structures give position estimation and velocity vectors of image elements. A model of image contour perception is presented. Other models describing other functions of the visual system are proposed to implement a research program. Author (ESA)

**N86-14885#** Joint Publications Research Service, Arlington, Va.  
**USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES Abstracts Only**

22 Oct. 1985 82 p Transl. into ENGLISH from various Russian articles

(JPRS-UBB-85-024) Avail: NTIS HC A05/MF A01

U.S.S.R. progress in the biomedical and behavioral sciences is reported. Topics discussed include: aerospace medicine, Agrotechnology; biochemistry; biophysics; biotechnology; ecology; food technology; genetics; human factors; immunology; laser effects; manne mammals; microbiology; general medicine; military medicine; pharmacology and toxicology; physiology; public health; radiation biology and psychology.

**N86-14886#** Joint Publications Research Service, Arlington, Va.  
**VOICE ANALYZER FOR EVALUATING PILOT'S CONDITION Abstract Only**

S. DVIGANTSEV In its USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-85-024) p 30 22 Oct. 1985 Transl. into ENGLISH from Gudok (Moscow), 15 Aug. 1985 p 4

Avail: NTIS HC A05/MF A01

This article reports on the development of a system called Equipment for Distinguishing Speech-Signal Parameters (SVPRS). The system is intended for monitoring the condition of aviation crews in the course of long flights through voice analysis from radio conversations. The system is capable of evaluating a subject's emotional state on the basis of a single spoken word, it is claimed. The system is being developed by the department of aviation medicine of the State Scientific Research Institute of Civil Aviation, with assistance from the USSR Academy of Sciences' Institute of Higher Nervous Activity and Neurophysiology, and, also, cyberneticists of Leningrad. The system consists of a magnetic memory, audio-signal filters, a frequency analyzer, a minicomputer, and instruments for processing recordings of speech and for input of data into the computer. Work on perfecting the system is said to be continuing. B.W.

**N86-14887#** Joint Publications Research Service, Arlington, Va.  
**ALCOHOL EFFECTS ON BRAIN Abstract Only**

M. IGNATENKO In its USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-85-024) p 54-55 22 Oct. 1985 Transl. into ENGLISH from Pravda (Moscow), 19 Aug. 1985 p 7

Avail: NTIS HC A05/MF A01

The article reports on a physiological adaptation experiment which was being conducted in the Kara-Kumy Desert. A group of 12 subjects was taking part in the experiment. The group consisted of six Ashkhabad residents and six Moscow residents. For the first time, residents of Central Asia who are acclimatized to high temperatures were taking part in such an experiment simultaneously with residents of the central Russian republic who are not accustomed to desert conditions. The Russian and Asian groups' adaptability to desert conditions was compared. This program was



aimed at gaining detailed knowledge of processes which take place in the body from the effect of stress conditions. B.W.

**N86-15866#** Joint Publications Research Service, Arlington, Va.  
**PROBLEMS OF STUDYING FLIGHT WORK IN SOVIET AVIATION MEDICINE OF THE 1920'S - 1930'S**

V. M. MUNIPOV *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 1-10 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 4-11  
 Avail: NTIS HC A08

Multifaceted investigations of the flying work by Soviet aviation medicine in the 1920 to 1930s are described. The early stages of the professional activity that is at present termed ergonomic foundations of the design, manufacture and use of the aircraft are examined. One of the first formulations of the problem of standardization of the human factors is discussed. Author

**N86-15871#** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF LEVEL OF PHYSICAL ACTIVITY ON LIPID METABOLISM OF FLIGHT PERSONNEL**

V. I. LIBKIND and V. D. VLASOV *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 40-43 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 29-31  
 Avail: NTIS HC A08

Lipid metabolism of healthy pilots was investigated and verified by the PWC sub 170 test. Pilots with a lower physical activity showed high levels of cholesterol, triglycerides, total lipids, LDL and low levels of HDL as averaged per group. The PWC sub 170 value and the concentration of lipid fractions in blood were found to be highly correlated, the correlation being nonlinear. The nonlinear regression data suggest that greater physical activity leads to a decrease of the lipid concentration and an increase of the content of high density lipid-protein complexes. Author

**N86-15872#** Joint Publications Research Service, Arlington, Va.  
**OXYGENATION AND REGIONAL CIRCULATION IN GINGIVAL MUCOSAL TISSUES UNDER EFFECT OF HEAD-TO-PELVIS (+GZ) ACCELERATIONS**

S. I. VOLVACH, Y. A. KOVALENKO, L. I. VORONIN, N. V. ULYATOVSKIY, V. K. GABYSHEV, V. I. NIKIFOROV, and V. V. ARKHIPOV *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 44-49 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 31-35  
 Avail: NTIS HC A08

The information content of a new rheopolarographic procedure used to determine the oxygen balance and regional circulation of the gingival mucosa was measured, bearing in mind the applicability of the procedure as an objective index of human tolerance to +Gz acceleration. It was found that the parameters of the oxygen balance and regional circulation of the gingival mucosa were well correlated with blood pressure in the floor of the auricle. In contrast to the traditional methods for assessing tolerance to acceleration, the new procedure provides information about the health condition of the centrifuged subjects on a continuous basis. Variations in the oxygen balance and regional circulation of the gingival mucosa helped to identify compensatory reactions of the cardiovascular system in response to +Gz acceleration. Author

**N86-15873#** Joint Publications Research Service, Arlington, Va.  
**INVESTIGATION OF SOME ASPECTS OF HUMAN AMINO ACID METABOLISM DURING 120-DAY ANTIORTHOSTATIC HYPOKINESIA**

T. F. VLASOVA, Y. B. MIROSHNIKOVA, and A. S. USHAKOV *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 50-53 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 35-38

Avail: NTIS HC A08

The free amino acid pool of blood of man exposed to 120-day head-down tilt (at -4 deg) was examined. Beginning with bed rest day 28 and till the end of the study, the amino acid pool increased. The increase involved most free amino acids which was produced by a decline of anabolic and stimulation of catabolic processes during hypokinesia. Author

**N86-15874#** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF 7-DAY IMMERSION HYPOKINESIA ON CHARACTERISTICS OF PRECISION MOVEMENTS**

L. S. GRIGORYEVA and I. B. KOZLOVSKAYA *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 54-59 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 38-42

Avail: NTIS HC A08

Experiments were carried out to study the effect of 7-day immersion hypokinesia on precision movements that included reproduction of a certain isometric strain of leg muscles and angular displacement of the ankle relative to the 90 deg position. Precision disorders were seen in the structure of movements which lost their stereotypic pattern and became fragmentary, transforming into slow approximate movements versus the pattern of preimmersion movements that were of a rapid programmed control type. Precision changes during plantar flexion movements were usually excessive, hypermetric and almost twice longer than preimmersion. The origin of the above precision changes seems to be primarily associated with muscle atonia. At the same time data analysis shows that in nearly 50% of cases the values of precision changes in movements of various types (efforts and displacements) and different directions (plantar and dorsiflexion) were correlated. This is suggestive of common central mechanisms underlying their development. Author

**N86-15875#** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF DRY IMMERSION MODEL ON PARAMETERS OF FLUID-ELECTROLYTE METABOLISM, BLOOD PLASMA ALDOSTERONE AND CORTISOL LEVELS IN INDIVIDUALS DIFFERING IN BODY FLUID CONTENT**

M. A. YUNUSOV, V. N. ORLOV, and T. V. VINOKHODOVA *In its* USSR Report: Space Biology and Aerospace Medicine Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 60-64 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 42-45

Avail: NTIS HC A08

Experiments were carried out to study the effect of dry immersion on fluid-electrolyte metabolism, aldosterone and cortisol content in 22 test subjects with varying content of water in the organism. It was found that dry immersion produced a diuretic effect and facilitated a higher excretion of electrolytes and a lower aldosterone content. The test subjects with a higher content of water in the organism (16 subjects) exhibited a more distinct and prolonged polyuria. During the recovery period the aldosterone content increased insignificantly and failed to return to the baseline level, in contrast to the subjects with a normal content of water in the organism. Author

**N86-15879#** Joint Publications Research Service, Arlington, Va. **MAN'S TOLERANCE TO FULMINANT FORM OF HYPOXIC HYPOXIA**

A. Y. KATKOV, Y. P. VYAZOVA, R. N. CHABDAROVA, I. S. KRIKUN, and Z. M. KUDRYASHOVA *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 82-86 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 57-60

Avail: NTIS HC A08

Rapidly progressing, or fulminant form of hypoxic hypoxia is among the extreme factors to which one is exposed in case of depressurization of a flight vehicle. It can be simulated by means of breathing with inert gas. The results of testing reactions to fulminant hypoxia elicited by breathing nitrogen are presented in this report. B.W.

**N86-15880#** Joint Publications Research Service, Arlington, Va. **INVESTIGATION OF CATECHOLAMINE METABOLISM AT HIGH ALTITUDES**

N. A. DAVYDOVA, Y. A. SENKEVICH, M. B. BELAKOVSKIY, and S. V. SAMRATOVA *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 87-91 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 60-63

Avail: NTIS HC A08

The function of the sympathoadrenal system (SAS) measured with respect to the content of epinephrine and norepinephrine in blood and urine as well as dopamine and DOPA in urine of mountaineers and athletes nontrained to high altitudes was examined. It was found that the mediator component of the SAS was activated in the athletes and that the adaptive capability of the SAS of the mountaineers was adequately high. Author

**N86-15887#** Joint Publications Research Service, Arlington, Va. **INFORMATIVENESS OF ECHO SIGNAL IN PULSED ULTRASONOGRAPHY OF THE BRAIN (WITH USE OF MODEL)**

L. G. SIMONOV, L. A. ROZENBLYUM, and N. N. BOGDANOVA *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 125-130 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 83-85

Avail: NTIS HC A08

A change in hydrostatic pressure leads to change in intracranial volumetric relationships (IVR) of liquid media, which has a substantial effect on intracranial pressure and blood supply to the brain. As a noninvasive method of assessing IVR, one can use ultrasonic pulsed probing of the walls of the cerebral ventricles. However, because of its low noise immunity and several other factors that affect the amplitude of the echo signal, the reliability of such a method for evaluation of IVR of liquid media is not satisfactory. A method of probing intracranial structures is described in which the ultrasonic pulse penetrates through the frontal bone, passes through the ventricle and is reflected from the stationary occipital bone. A model was developed to determine the informativeness of an echo obtained in this manner. It was demonstrated on this model that a change in level of the echo signal is elicited by change in ventricular volume. The base width of the ventricle causes this to be a monotone function. It was shown that such a probing method is less sensitive to change in acoustic properties of brain tissue than ultrasonic methods involving direct probing of ventricular walls. B.W.

**N86-15888#** Joint Publications Research Service, Arlington, Va. **INVESTIGATION OF POSSIBILITY OF USING TWO-FREQUENCY IMPEDOMETRY FOR ESTIMATION OF PROPORTION OF TOTAL AND EXTRACELLULAR BODY FLUIDS**

V. P. KROTOV, Y. G. BAZUNOVA, and B. S. KULAYEV *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 131-136 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 86-89

Avail: NTIS HC A08

According to the results of postflight examination of cosmonauts, exposure to weightlessness leads to changes in fluid-electrolyte metabolism and in ratio between liquid phases of the body. It is not possible to establish the kinetics of fluid redistribution in the body as a function of duration of weightlessness, since a method has not yet been found that would permit measurement of body fluids and proportion of each in flight. Recently, works have been published, which report that it is possible to determine the ratio of total body fluid to its extracellular component. This is done by concurrently determination of impedance (Z) in the measured section of the body during passage of current through it at different frequencies. However, all of the studies cited above have a clinical and physiological orientation, with which it is impossible to determine distinctly the quantitative relationship between total fluid and its extracellular component. The objective in this research is to explore the possibility of using two-frequency impedometry to determine the quantitative ratio between total body fluid and its extracellular component. B.W.

**N86-15889#** Joint Publications Research Service, Arlington, Va. **AUTOMATIC DETERMINATION OF CARDIAC OUTPUT FROM RHEOGRAM OF THE TRUNK**

I. V. SOKOLOVA and L. A. KHRYASHCHEVA *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 137-140 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 89-90

Avail: NTIS HC A08

Depending on the method of recording the trunk rheogram (TRG) and theoretical validation of formulas for subsequent calculations, many rheographic analogues of characteristics of cardiac output are calculated from the amplitude and period of the TRG with use of appropriate multiplicative coefficients. The technical execution of the system for automatic determination of characteristics of cardiac output on the TRG in the form of an algorithm for a computer does not impose restrictions on structure and number of coefficients, and it offers broad research opportunities for studying them in comparison of rheography to other methods. The algorithm for automatic determination of cardiac output features from the TRG is developed in this investigation in the form of a set of programs in the FORTRAN-IV algorithmic language for YeS or SM series computers, and it solves the following problems: (1) isolation of rheowave as the valid signal in the presence of interference, (2) identification of elements in the rheowave structure for the duration of the cardiac cycle, (3) calculation of rheographic characteristics of cardiac output for the cardiac cycle, and (4) statistical averaging of rheographic characteristics of cardiac output in a specified interval for a specified level of significance. B.W.

**N86-15890#** Joint Publications Research Service, Arlington, Va. **FUNCTIONAL STATE OF THE OLFACTORY ANALYZER IN A PRESSURIZED ENVIRONMENT**

S. S. PASHIN and G. I. SOLOMIN *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 141-144 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 90-92

Avail: NTIS HC A08

Man's long-term presence in pressurized environments (PE) imposes certain requirements of the composition of the artificial atmosphere in space vehicles. It is important for there to be no



odors of various impurities. The latter is attributable to the range of reflex effects of chemicals through receptors of the upper respiratory tract on other analyzers, functional state of the central nervous system, various organs, systems and the body as a whole. It is particularly undesirable to have persistent odorous stimuli in the atmosphere of a pressurized environment, and for this reason odorimetric studies are a mandatory stage of setting hygienic standards. However, such studies are performed under ordinary laboratory conditions, without consideration of the possible functional changes in the olfactory analyzer related to long-term isolation of an individual. An attempt was made in this research to demonstrate any possible functional changes in the olfactory analyzer during long-term exposure of man to the artificial atmosphere of a pressurized chamber. B.W.

**N86-15891#** Joint Publications Research Service, Arlington, Va. **GAS CHROMATOGRAPHIC ANALYSIS OF FREE FATTY ACIDS OF SKIN SURFACE LIPIDS** V. P. MAYDINA, B. L. AVETISYANTS, and D. M. DUBININ *In its USSR Report: Space Biology and Aerospace Medicine*, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 145-148 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 93-94  
Avail: NTIS HC A08

The basic components of sebaceous gland secretions are triglycerides, which are hydrolyzed to free fatty acids, monoglycerides and diglycerides on the skin surface, under the effect of lipases of microorganisms and other factors. Studies of the microflora of the skin surface revealed that it contains aerobic staphylococci, anaerobic propionobacteria and fungi which have lypolytic activity. A correlation was established between quantity of microorganisms of the micrococcus family and acne propionobacteria on the skin, on the one hand, and rate of formation of free fatty acids (FFA) of sebum cutneum, on the other hand. The bactericidal and fungicidal properties of the skin are attributed to the presence of FFA on its surface. The authors of hypotheses on the pathogenesis of acne simplex believe that inflammation of the follicular wall of a sebaceous gland is related to the irritating effect of FFA. Because of the high sensitivity and informativeness of gas chromatography, it has gained wide use in the last 10 years in biomedical investigations. The objective here was to develop a gas chromatography method for examining the FFA of sebum cutaneum. B.W.

**N86-15897** Department of the Army, Washington, D. C. **ANTI-TRYPANOSOMAL ACTIVITY OF PLATINUM COORDINATION COMPOUNDS** Patent M. S. WYSOR and L. A. ZWELLING, inventors (to Army) 30 Jul. 1985 4 p (AD-D011860; US-PATENT-4,532,122; US-PATENT-APPL-SN-250991; US-PATENT-CLASS-424-10)  
Avail: US Patent and Trademark Office CSCL 060

A novel method has been developed for improved chemotherapy of animals infected with African trypanosomials. The method involves the concurrent administration of therapeutically effective amounts of cis-diamminedichloroplatinum (II) and bis-(diethylthiocarbamoyl)disulfide (disulfiram) or diethyl dithiocarbamate to the hydrated animal. Author (GRA)

**N86-15898#** Stanford Univ., Calif. Dept. of Psychology. **COMPUTATIONAL MODELS OF HUMAN VISION WITH APPLICATIONS** Final Report, Oct. 1985 B. A. WANDELL 12 Sep. 1985 7 p (Contract NCC2-44) (NASA-CR-176413; NAS 1.26:176413) Avail: NTIS HC A02/MF A01 CSCL 06P

Perceptual problems in aeronautics were studied. The mechanism by which color constancy is achieved in human vision was examined. A computable algorithm was developed to model the arrangement of retinal cones in spatial vision. The spatial frequency spectra are similar to the spectra of actual cone mosaics. The Hartley transform as a tool of image processing was evaluated

and it is suggested that it could be used in signal processing applications, GR image processing. E.A.K.

**N86-15899#** Desmatics, Inc., State College, Pa. **STATISTICAL RESEARCH ON PROBLEMS OF BIODYNAMICS** Final Report K. C. BURNS, C. A. MAURO, and D. E. SMITH Jul. 1985 23 p (Contract N00014-79-C-0128) (AD-A157993; TR-112-19) Avail: NTIS HC A02/MF A01 CSCL 06S

The statistical research conducted focused on two major problem areas within the Navy's biodynamics program at NBDL. Those were: (1) impact acceleration injury, and (2) ship motion sickness. Additional research was conducted in the area of performance testing, which is relevant to both of the primary research topics. The following sections briefly summarize the research accomplished under this contract and provide a reference list of all technical reports (with abstracts), journal articles, and presentations resulting from this research effort. GRA

**N86-15900#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. **THE MIDDLE LATENCY RESPONSE (MLR) AND STEADY STATE EVOKED POTENTIAL (SSEP) IN NEONATES** Ph.D. Thesis R. C. FIFER May 1985 180 p (AD-A158007; AFIT/CI/NR-85-100D) Avail: NTIS HC A09/MF A01 CSCL 06P

This study evaluated the characteristics of the middle latency response (MLR) and the related steady state evoked potential (SSEP) in a total of 36 neonates. The reports of previous investigators have cast doubt on the existence of both the MLR and SSEP in neonates. The measurements in these studies were obtained, however, using stimulation and recording parameters that are appropriate for adults. Since virtually all other aspects of neonate audition differ significantly from comparable adult attributes, one goal of this study was to determine the appropriate parameters with which to obtain a valid MLR and SSEP in very young children. Other goals of this study included: (1) evaluation of two different algorithms for low-frequency sensitivity prediction using the SSEP; (2) investigation of the stability of the SSEP over repeated trials; and (3) elucidation of the relationship the neonatal MLR to later occurring auditory evoked potentials. GRA

**N86-15901#** Maryland Univ., College Park. **BINOCULAR IMAGE FLOWS: STEPS TOWARD STEREO - MOTION FUSION** A. M. WAXMAN and J. H. DUNCAN May 1985 60 p (Contract DAAK70-83-K-0018; DE-AC03-84ER-80189) (AD-A158089; CAR-TR-119; CS-TR-1494) Avail: NTIS HC A04/MF A01 CSCL 06P

In decomposing the visual information processing task into several stages, it is the intermediate level which is responsible for the recovery of surface shapes in a scene. It is often described as a set of shape from modules which, acting independently and in parallel, feed a viewer centered 2.5-D sketch of the visual field. Two of the most commonly studied and closely related modules are shape from stereo and shape from monocular motion. The analyses of visual data by stereo and motion modules have typically been treated as separate, parallel processes which both feed a common viewer-centered 2.5-D sketch of the scene. When acting separately, stereo and motion analyses are subject to certain inherent difficulties: (1) stereo must resolve a combinatorial correspondence problem and is further complicated by the presence of occluding boundaries; (2) motion analysis involves the solution of nonlinear equations and yields a 3-D interpretation specified up to an undetermined scale factor. This report describes a new module which unifies stereo and motion analysis in a manner in which each helps to overcome the other's shortcomings. One important result is a correlation between relative image flow (i.e., binocular difference flow) and stereo disparity; it points to the importance of the ratio  $\delta/\dot{\delta}$ , rate of change of disparity  $\delta$  to disparity  $\delta$ , and its possible role in establishing stereo

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correspondence. Our formulation may reflect the human perception channel probed by Reagan and Beverley (1979). GRA

**N86-15902#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

### **COMPARISON OF THE AIR FORCE FEMALE AND MALE PILOT GROUNDED TIME IN THE AIR FORCE MILITARY AIRLIFT COMMAND M.S. Thesis**

J. A. HOLL Jun. 1985 35 p  
(AD-A158093; AFIT/CI/NR-85-64T) Avail: NTIS HC A03/MF A01 CSCL 051

The US Air Force presently has over 200 female pilots, and the numbers are steadily increasing. This thesis is the first step in determining the effect of female pilots on the Air Forces' flying squadrons' efficiency and effectiveness. This protocol will compare the average number of days per year men and women pilots are grounded for medical reasons. The duty not involving flying time or DNIF statistics will be used for the data. There are no known studies indicating there is a significant difference in male/female pilot medial absenteeism rates. If the female DNIF rate is found to be significantly larger than the males, it may indicate an effect on the squadrons readiness abilities. The Military Airlift Command (MAC) is chosen for sampling because a relatively large number of female pilots (96) are assigned to this command. The women will be compared to a representative sample of 288 male pilots also assigned to MAC. AF form 1041, which reports DNIF time to Command Headquarters, will be used to collect the DNIF days from the past year; age, rank, and marital status will also be collected. DNIF rates will be calculated correcting for person/months of observation. The age, rank, and marital status specific rates will also be compared. Author (GRA)

**N86-15903#** Army Environmental Hygiene Agency, Aberdeen Proving Ground, Md.

### **TOPICAL HAZARD EVALUATION PROGRAM OF CANDIDATE INSECT REPELLENT A13-35770 HEXAHYDRO-1-(2-METHYLCYCLOHEXYL) CARBONYL-1-H-AZEPINE Report, Aug. 1984 - Jun. 1985**

R. D. RUSSELL Jun. 1985 10 p  
(AD-A158386; USAEHA-75-51-0435-85) Avail: NTIS HC A02/MF A01 CSCL 06T

Topical Hazard Evaluations of USDA Candidate Insect Repellent A13-35770 were performed using New Zealand White rabbits, albino Hartley guinea pigs, and Sprague Dawley rats. Chemical A13-35770 produced moderate to severe primary dermal irritation and necrosis in rabbits and guinea pigs. These effects were quantitatively worse in rabbits than in guinea pigs. This compound was moderately toxic to rats when given by the oral route. GRA

**N86-15904#** Army Research Inst. of Environmental Medicine, Natick, Mass.

### **HUMAN THERMOREGULATORY RESPONSES TO COLD AIR ARE ALTERED BY REPEATED COLD WATER IMMERSION**

A. J. YOUNG, S. R. MUZA, M. N. SAWKA, R. R. GONZALEZ, and K. B. PANDOLF Aug. 1985 30 p  
(Contract DA PROJ. 3E1-62777-A-879)  
(AD-A158871; USARIEM-M38/85) Avail: NTIS HC A03/MF A01 CSCL 06S

The effects of repeated cold water immersion on thermoregulatory responses to cold air were studied in seven males. A cold air stress test (CAST) was performed before and after completion of an acclimation program consisting of daily 90-min cold (18 C) water immersion, repeated five times a week for five consecutive weeks. The CAST consisted of resting 30 min in a comfortable (24 C, 30% rh) environment followed by 90 min in cold (5 C, 30% rh) air. Pre- and post-acclimation, metabolism (M) increased (P 0.01) by 85% during the first 10 min of CAST, and thereafter rose slowly. After acclimation, M was lower (P 0.02) at 10 min of CAST compared to before, but by 30 min M was the same. Therefore, shivering onset may have been delayed following acclimation. After acclimation, rectal temperature (T subscript re) was lower (P 0.01) before and during CAST, and the drop in T subscript re during CAST was greater (P 0.01) than before. Mean

weighted skin temperature (T subscript sk) was lower (P 0.01) following acclimation than before, and acclimation resulted in a larger (P 0.02) T subscript re to T subscript sk gradient. Plasma norepinephrine increased during both CAST (P 0.002), but the increase was larger (P 0.004) following acclimation. These findings suggest that repeated cold water immersion stimulates development of true cold acclimation in man, as opposed to habituation. The cold acclimation produced appears to be of the insulative type. GRA

**N86-15905#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

### **SOME EFFECTS OF ALCOHOL AND SIMULATED ALTITUDE ON COMPLEX PERFORMANCE SCORES AND BREATHANALYZER READINGS**

W. E. COLLINS, H. W. MERTENS, and E. A. HIGGINS Jul. 1985 12 p  
(AD-A158925; DOT/FAA-AM-85-5) Avail: NTIS HC A02/MF A01 CSCL 06O

This study assessed possible interactive effects of alcohol and a simulated altitude of 12,500 ft. Each of 17 men was trained on the various tasks that comprise the Multiple Task Performance Battery and then performed over a 2-week period in four experimental sessions, viz, ground level (1,300 ft), with and without alcohol, and altitude (12,500 ft), with and without alcohol. Subjects breathed appropriate gas mixtures through oxygen masks at both ground level and high altitude. Subjects performed for 3 hours in the afternoon. Alcohol doses were 2.2 mL of 100-proof vodka per kilogram of body weight mixed with three parts of a selected juice. Each 1-hour test block included five 10-minute performance periods with varying workloads and a 10-minute period for controlled breathalyzer measurements. Results showed no differential effect of simulated altitude on breathalyzer readings (peaks averaged .078% at 12,500 ft and .077% at ground level). The best performance occurred at ground level under placebo conditions; the 12,500-ft simulated altitude produced some decrement, for the placebo scores were depressed by altitude. Thus, there was no interactive effect of alcohol and altitude on either breathalyzer readings or performance scores. However, the general decrement produced by altitude (with or without alcohol) serves to reduce further whatever margin of safety remains in performance skills following alcohol ingestion. Author (GRA)

**N86-15906#** Northwestern Univ., Evanston, Ill. **ENHANCING VISUAL SENSITIVITY Final Report, 1 Oct. 1983 - 30 Sep. 1984**

R. SEKULER 24 May 1985 36 p  
(Contract AF-AFOSR-0246-80)  
(AD-A158799; AFOSR-85-0663TR) Avail: NTIS HC A03/MF A01 CSCL 05J

This report summarizes the major studies carried out under AFOSR grant 80-0246 from October 1, 1983 through September 30, 1984. During this report period we did coordinated work on two aspects of motion perception. One work unit extended our earlier research on how training affects direction discrimination. These studies give new insights into the physiological locus and character of this particular form of perceptual learning. The second work unit explored perceptual confusions among motion metamers in order to develop a quantitative model of the mechanisms that underlie human direction perception. The model is built around a small number (n=12) of broadly-tuned directionally-selective mechanisms. This model gives an excellent account of the experiments with motion metamers. Author (GRA)

**N86-15907#** Dalhousie Univ., Halifax (Nova Scotia). **VISUAL SENSITIVITIES AND DISCRIMINATIONS AND THEIR ROLES IN AVIATION** Interim Technical Report, 1 Oct. 1983 - 30 Sep. 1984

D. REGAN 17 Jun. 1985 44 p  
(Contract AF-AFOSR-0030-84)  
(AD-A158962; AFOSR-85-0639TR) Avail: NTIS HC A03/MF A01 CSCL 05I

This report presents four studies. An individual's ability to discriminate small differences in orientation about 5% and 0.5 deg respectively contrasts with the coarse size and orientation selectivity of neurons in the visual cortex of the brain. We report evidence that these fine discriminations are achieved by means of opponent processing: size discrimination is determined by antagonism between neurons that are coarsely selective for size, and orientation discrimination is mediated by neurons that are coarsely selective for orientation. Opponent processing implies that the neurons that determine detection are not the neurons that determine fine discrimination: we have experimentally verified that prediction. We have measured motion discrimination in pilots and attempted to predict flying performance in simulators and telemetry-tracked aircraft. Correlations between laboratory tests and flying performance were encouraging, and were much stronger than for simple visual sensitivities such as motion on contrast sensitivity. Some objects are invisible unless they move relative to the background, for example, a grassy hillock viewed against grass in nap of the earth helicopter flight. We have compared human visual sensitivity to such objects, with sensitivity to conventional objects defined by brightness difference. Spatial summation area, and temporal summation area are much larger for motion-defined objects than for brightness-defined objects. We report evidence that the Vector Analysis technique of mathematics may be relevant to the physiological study of visual cues in guided self-motion. GRA

**N86-15908#** North Carolina Univ., Chapel Hill. Center for Stochastic Processes.

**STOCHASTIC DIFFERENTIAL EQUATIONS FOR NEURONAL BEHAVIOR**

S. K. CHRISTENSEN and G. KALLIANPUR Jun. 1985 44 p  
(Contract F49620-82-C-0009)  
(AD-A159099; TR-103; AFOSR-85-0706TR) Avail: NTIS HC A03/MF A01 CSCL 06P

This article extends the recent work of Kallianpur and Wolpert modeling the behavior of neurons by means of stochastic partial differential equations on the dual of a nuclear space. The extensions will cover nuclear spaces of a more general structure and will apply to models described in terms of more general differential operators. A second objective of this article is to present a theoretical framework which will include the model recently proposed and heuristically investigated by Wan and Tuckwell. The authors illustrate their approach and its application by giving a rigorous treatment of the Wan and Tuckwell model. But first they briefly describe the neurophysiological context. Author (GRA)

**N86-15909#** North Dakota State Univ., Fargo. Dept. of Electrical and Electronics Engineering.

**APPLICATION OF THE SYSTEM IDENTIFICATION TECHNIQUE TO GOAL-DIRECTED SACCADIC FINAL REPORT, May 1984 - May 1985**

J. D. ENDERLE Jul. 1985 30 p  
(Contract F49620-82-C-0035)  
(AD-A159102; USAFSAM-TR-85-37) Avail: NTIS HC A03/MF A01 CSCL 06P

System identification techniques were used to estimate muscle forces during horizontal saccadic eye movements in order to better understand the neuronal control strategy. The lateral and medial rectus muscle of each eye was modeled as a parallel combination of an active state tension generator with a viscosity and elastic element, connected to a series elastic element. The eyeball was modeled as a sphere connected to a viscosity and elastic element. The predictions of the model were shown to be in good agreement with the data. The results of extensive analysis did not support

the existence of a postulated continuous-time external feedback control mechanism. Analysis of the data, however, did support a time optimal control strategy, a strategy which directs the eyeball to its destination in minimum time to saccades of all sizes. GRA

**N86-15910#** Naval Health Research Center, San Diego, Calif. **A COMPARISON OF THE EFFECTS OF CIRCUIT WEIGHT TRAINING ON MEN AND WOMEN** Interim Report

E. J. MARCINIK, J. A. HODGDON, J. J. OBRIEN, and K. MITTLEMAN Jun. 1985 17 p  
(Contract M00-96-PN)  
(AD-A159419; NAVHLTHRSCHC-85-13) Avail: NTIS HC A02/MF A01 CSCL 06S

Prior to training, women exhibited 52.6% of male upper torso dynamic strength and 56.5% of male lower torso dynamic strength. Both sexes responded in a similar manner to the circuit weight training format. Dynamic muscular strength gains were 13.7% for men and 15.7% for women. Stamina and all indices of relative body composition were unaffected by training. It can be concluded that circuit weight training demonstrates a potential for shipboard application. It results in the muscular strength gains shown to be necessary for shipboard work performance. It also helps to maintain aerobic fitness in a limited space environment. GRA

## 53

### BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

**A86-16922\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**JUDGMENTS OF NATURAL AND ANOMALOUS TRAJECTORIES IN THE PRESENCE AND ABSENCE OF MOTION**

M. K. KAISER (NASA, Ames Research Center, Moffett Field, CA; Michigan, University, Ann Arbor), D. R. PROFFITT, and K. ANDERSON (Virginia, University, Charlottesville) Journal of Experimental Psychology (ISSN 0278-7393), vol. 11, no. 4, 1985, p. 795-803. refs  
(Contract NIH-HD-16195)

Three experiments using McCloskey's curved tube problem, in which people are asked to predict the path that a ball takes when it is shot through a tube curved in a 'C' or spiral, are reported. The first experiment compared the perceptual and representational competencies of observers in recognizing the natural trajectory of the ball, and the second examined the competencies of children on this problem. The third experiment attempted to enhance the representational competence of observers by encouraging them to use a mental imagery approach to the problem. The subjects were presented with both on-going events and with static representations of the event. Men performed better than women under both these conditions, a result not attributable to formal instruction in physics. Children showed no gender effect. The use of mental imagery did not enhance performance on the static test. C.D.

**A86-17062**

**SYSTEM DEVELOPED FOR PSYCHOLOGICAL SELECTION OF AT CONTROLLERS**

E. N. ZAITSEVA (Scientific, Research, and Experimental Centre for the Automation of Civil Aviation Air Traffic Control, USSR) and V. F. TOKAREV (Ministerstvo Grazhdanskoi Aviacii, Moscow, USSR) ICAO Bulletin, vol. 40, Oct. 1985, p. 30-33.

An evaluative system is developed for the vocationally important qualities (VIQ) of ATC personnel. A total of 50 psychological and psychophysiological techniques involving the evaluation of questionnaires and laboratory test procedures have been assessed, with the results thus obtained for ATC trainees and controllers being used to evaluate the predictive values of these techniques.

This predictive value assessment led to the identification of 14 highly informative VIQ tests involving 27 indicators. O.C.

**A86-17352**

**NEURAL DYNAMICS OF PERCEPTUAL GROUPING - TEXTURES, BOUNDARIES, AND EMERGENT SEGMENTATIONS**

S. GROSSBERG and E. MINGOLLA (Boston University, MA) Perception and Psychophysics (ISSN 0031-5117), vol. 38, no. 2, Aug. 1985, p. 141-171. refs  
(Contract AF-AFOSR-85-0149; DAAG29-85-K-0095)

A variety of perceptual grouping (PG) and segmentation phenomena, including the PG of textured images, randomly defined images, and images built up from penodic scenic elements, were analyzed in the framework of a real-time visual processing theory (VPT). The theory introduces the distinction between a boundary contour system (BCS) and a feature contour system (FCS) to explain paradoxical data concerning brightness, color, and form perception. Implications of the VPT for the process of PG are discussed. Computer simulations of PG are presented which establish the competence of the BCS as a PG system. The properties of the BCS are compared with probabilistic and artificial intelligence models of segmentation. The results suggest a new approach to the design of computer vision systems to provide a universal set of rules for PG of scenic edges, textures, and smoothly shaded regions. I.S.

**A86-17772**

**A RULE-BASED MODEL OF HUMAN PROBLEM-SOLVING BEHAVIOR IN DYNAMIC ENVIRONMENTS**

A. KNAEUPER (Forschungsinstitut fuer Antrhoprotechnik, Wachtberg-Werthhoven, West Germany) and W. B. ROUSE (Georgia Institute of Technology, Atlanta) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-15, Nov.-Dec. 1985, p. 708-719. refs  
(Contract N00014-82-K-0487)

Human problem solving is considered with emphasis on situations involving human-machine interaction in detecting, diagnosing, and compensating for failures in engineering systems. An overall model is presented which considers the breath and robustness of human problem-solving behavior in dynamic environments typical of engineering systems. A realization of the general structure of this model within a particular rule-based computer program is discussed. In this program the human behavior in controlling a dynamic process is represented by a set of production rules. The selection of appropriate production rules for a given situation is performed by ordering the rules for specific tasks and by a control mechanism. The latter provide a means to access only a small part of the knowledge base at a time in order to derive decisions as opposed to searching the whole knowledge base. This program was applied to model human problem solving in a process control task. Results from comparing model and subject behavior are presented and discussed.

Author

**A86-17774\* Search Technology, Inc., Norcross, Ga. PLANT - AN EXPERIMENTAL TASK FOR THE STUDY OF HUMAN PROBLEM SOLVING IN PROCESS CONTROL**

N. M. MORRIS (Search Technology, Inc., Norcross, GA), W. B. ROUSE, and J. L. FATH (Georgia Institute of Technology, Atlanta) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-15, Nov.-Dec. 1985, p. 792-798. refs

(Contract NAG2-123; NAS2-12048; N00014-82-K-0487)

An experimental tool for the investigation of human problem-solving behavior is introduced. Production Levels and Network Troubleshooting (PLANT) is a computer-based process-control task which may be used to provide opportunities for subjects to control a dynamic system and diagnose, repair, and compensate for system failures. The task is described in detail, and experiments which have been conducted using PLANT are briefly discussed.

Author

**A86-18546**

**'ACTIONS NOT AS PLANNED' IN MILITARY AIR-TRAFFIC CONTROL**

C. P. LANGAN-FOX and J. A. C. EMPSON (Hull, University, England) Ergonomics (ISSN 0014-0139), vol. 28, Nov. 1985, p. 1509-1521. refs

Observations were made of the errors made by eight air-traffic controllers over two periods each of 2 1/2 hours. Errors were classified using a recently devised classification of motor-program errors (Reason 1979), and all the controllers were observed under three conditions of workload, and performing two ostensibly similar air-traffic tasks. More errors were found with increasing workload, but only in one of the tasks. This was interpreted in terms of the pacing and time stress inherently imposed in that task. The assessment of error incidence seems a good candidate as a nonintrusive measure of workload. Analysis of errors in terms of Reason's typology showed no interaction with any of the other variables.

Author

**A86-18833**

**SELF-CONTROL OF PSYCHOPHYSIOLOGIC RESPONSE TO MOTION STRESS USING BIOFEEDBACK TO TREAT SICKNESS**

D. R. JONES, R. A. LEVY, L. GARDNER, R. W. MARSH, and J. C. PATTERSON (USAF, School of Aerospace Medicine, Brooks AFB, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, Dec. 1985, p. 1152-1157. refs

Investigators of the Neuropsychiatry Branch, Clinical Sciences Division, U.S. Air Force School of Aerospace Medicine (USAFSAM), provided biofeedback-moderated behavioral treatment to 53 fliers grounded for chronic, severe motion sickness, and followed each flier for 2 years after treatment completion. Success was defined as returning to and maintaining satisfactory operational flying status. Of these, 42 fliers (79 percent) met this criterion; three (6 percent) were partially successful, and eight (15 percent) were subsequently grounded for recurrent airsickness. Follow-on studies will investigate psychophysiological mechanisms through which this method of treatment works.

Author

**N86-14888#** Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Psychology.

**SKILL ACQUISITION: COMPILATION OF WEAK-METHOD PROBLEM SOLUTIONS Interim Report, Aug. 1984 - Aug. 1985**

J. R. ANDERSON 12 Aug. 1985 75 p

(Contract N00014-84-K-0064)

(AD-A158725; TR-85-1-ONR) Avail: NTIS HC A04/MF A01 CSCL 05J

Cognitive skills are encoded by a set of productions, which are organized according to a hierarchical goal structure. People solve problems in new domains by applying weak problem-solving procedures to declarative knowledge they have about this domain. From these initial problem solutions, production rules are compiled which are specific to that domain and that use of the knowledge. Numerous experimental results follow from this conception of skill organization and skill acquisition. These experiments include predictions about transfer among skills, differential improvement on problem types, effects of working memory limitations, and applications to instruction. The theory implies that all variety of skill acquisition, including that typically regarded as inductive, conforms to this characterization.

GRA

**N86-14889#** Old Dominion Univ., Norfolk, Va. Dept. of Psychology.

**ASSESSMENT OF VISUOSPATIAL ABILITIES USING COMPLEX COGNITIVE TASKS Final Report, 1 Jun. 1983 - 1 Apr. 1984**

G. L. ALLEN Nov. 1984 36 p

(Contract AF-AFOSR-0161-83)

(AD-A158919; AFOSR-85-0665TR) Avail: NTIS HC A03/MF A01 CSCL 05J

Two studies were conducted in separate areas concerned with visuospatial abilities. The first study was designed to examine the effects of type of instruction (verbal versus graphic) and sex of subject on the acquisition of procedural knowledge in a spatial

task. The spatial task employed was a computerized maze learning task, with trials to criterion and errors to criterion serving as dependent variables. Results indicated that graphic instructions led to fewer errors and trials to criterion than did verbal instructions. However, the performance of males was not superior to that of females, and the hypothesized interaction involving type of instruction and sex of subject was not found. Correlations between psychometric measures of cognitive abilities and measures of maze learning were easily interpreted for learning under graphic instructions but were difficult to interpret for learning under verbal instructions. These findings suggested the need for additional research focusing on: (1) replicating the current results, (2) delineating the factors underlying individuals' learning effectiveness under different types of instructions, and (3) examining individuals' awareness of the relationship between learning effectiveness and type of instruction in visuospatial tasks. The second study was designed to determine the relationship between performance on traditional paper-and-pencil tests of spatial abilities and performance on a task required macrospatial cognitive skills.

GRA

**N86-14890#** SRI International Corp., Menlo Park, Calif. Life Sciences Div.  
**NEUROPHYSIOLOGICAL BASES OF EVENT-RELATED POTENTIALS Annual Report, 1 May 1984 - 30 Apr. 1985**  
 C. S. REBERT Jun. 1985 64 p Original contains color illustrations  
 (Contract F49620-82-K-0016)  
 (AD-A158997; AFOSR-85-0575TR; AR-3) Avail: NTIS HC A04/MF A01 CSCL 06P

In order to more fully understand the physiological and psychological significance of event-related potentials, cortical and subcortical recordings are being obtained from monkeys performing in operant-conditioning tasks. Five cynomolgus monkeys were successfully trained in the cued-reaction time task at SRI International and recordings were obtained in several experimental conditions--tone discrimination, variation of interstimulus interval (ISI) and stimulus proportionality, and administration of atropine. Under some conditions stimulus salience was enhanced, as evidenced by enlarged evoked potentials, when the ISI and stimulus proportionality were altered. The effects of the anticholinergic drug atropine could be attributed to its peripheral effects. Preliminary examination of dynamic intracerebral interactions in one monkey was carried out in collaboration with A. Gevins at the EEG Systems Laboratory, and studies of two monkeys were continued at Stanford in order to study the P300 wave. Five female stump-tailed macaque monkeys were purchased, trained, and implanted and are ready for tone-light pairing and recording.

GRA

**N86-14891#** Vreuls Research Corp., Thousand Oaks, Calif.  
**PERFORMANCE MEASUREMENT GUIDELINES FOR RESEARCH Final Report, 15 Mar. 1980 - 30 Sep. 1982**  
 D. VREULS, R. W. OBERMAYER, A. L. WOOLDRIDGE, and M. J. KELLY 13 Jun. 1985 201 p  
 (Contract F49620-80-C-0058)  
 (AD-A159055; AFOSR-85-0642TR) Avail: NTIS HC A10/MF A01 CSCL 05I

All three military services are developing automated human performance measurement systems for aviation training devices and research on human performance. The purpose of this study was to create a set of aircrew-system performance measurement guidelines for research based on a review of current practice, and the measurement experience and technical judgement of the investigators. A subjective analysis of common measurement requirements among flight tasks for all phases of military aviation was conducted. The selection of system state variables would be dictated by the individual research problem, but guidelines for sampling, measure segmentation, and selection of transforms to create measurement were developed for common flight tasks and measurement problems. Performance measurement issues in system design, training, and automated performance measurement system design were discussed. FORTRAN program listings for common transforms and specialized multivariate data analyses for

selecting and constructing measurement from empirical data were appended. Use of the illustrated techniques was recommended, as was the need to update these techniques as measurement experience accrues.

GRA

**N86-14892#** School of Aerospace Medicine, Brooks AFB, Tex.  
**SYLLOGISTIC REASONING TASKS, A METHODOLOGICAL REVIEW Final Report, Jun. - Aug. 1983**  
 A. NARVAEZ and J. C. MILLER Jul. 1985 33 p  
 (Contract AF PROJ. 2312)  
 (AD-A159190; USAFSAM-TR-84-41) Avail: NTIS HC A03/MF A01 CSCL 05J

The syllogism is a system of reasoning that has been both used and investigated in psychology. The syllogism has many components and defining characteristics. Four basic models of form representation (spatial, linguistic, mixed, and algorithmic) used for linear syllogisms are briefly described. Debate concerning the processes that subjects use in solving syllogisms has led to the formulation of process models. It proposed model for linear syllogisms provides a way to break down the stages of syllogistic problem solving in order to predict performance. Many factors have been shown to affect or influence subjects' performance in syllogistic reasoning. Two historical hypotheses concerning sources of error are the atmosphere, or global impression, of the syllogism--and the conversion hypothesis--which emphasizes illicit processes subjects use in solving syllogisms. Other sources of error include figure effects (syllogisms in certain figures are more difficult than others) and personal bias (one's personal beliefs and attitudes influence performance on syllogisms that are emotion laden or of a controversial nature). Formal rules with which to test the validity of categorical syllogisms are proposed as guidelines for syllogism task construction, and suggestions for experimental design are presented.

GRA

**N86-14893#** Colorado Univ., Boulder. Center for Research on Judgment and Policy.  
**MOMENT BY MOMENT VARIATION IN THE COGNITIVE ACTIVITY OF EXPERTS**  
 R. M. HAMM Aug. 1985 91 p  
 (Contract N00014-81-C-0591)  
 (AD-A159466; AD-E440296; CRJP-257) Avail: NTIS HC A05/MF A01 CSCL 05J

This paper reports the analysis of moment by moment variation in the use of intuitive and analytical cognition by experts engaged in a complex judgement task. Six highway engineers were asked to think aloud while producing formulas that expressed their knowledge of how highway aesthetics, safety, and capacity are determined by sets of relevant factors. Each engineer's statements were measured with multiple indices of the use of intuitive or analytical cognition, thus producing a moment by moment measure of the engineer's cognitive activity. Measures reflecting the rate of alternation between intuition and analysis, as well as linear and nonlinear trends, were derived from this. Differences in these measures due to task topic were found. Two predictions from Cognitive Continuum Theory were supported by the data: (a) the average segment was more analytical on the capacity task than on the aesthetics task, and (b) the rate of alternation between analysis and intuition was faster on the capacity task, which has high standards, than on the aesthetics task. The subtask the engineer was engaged in was also measured over time, and it was found that subjects used different modes of cognitive activity on different subtasks. Finally, it was discovered that the proportion of time the engineer spent doing particular cognitive activities and particular subtasks was related to the production of more accurate formulas.

GRA

**N86-14894#** Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.

**AN INVESTIGATION OF JUDGMENTS OF CATEGORY FREQUENCY** Technical Report, Jul. 1982 - Jun. 1983

J. A. ENGLERT Oct. 1984 47 p

(Contract DA PROJ. 2Q2-62722-A-791)

(AD-A159555; ARI-TR-653) Avail: NTIS HC A03/MF A01

CSCS 05J

Two experiments investigated the kinds of frequency information that people can remember and individual differences in accuracy of reporting frequency. The task involved presenting individual instances of natural categories and requiring subjects to give absolute estimates of the number of times each category had occurred. In the first experiment, the variability of items was manipulated to assess whether subjects base their estimates on a direct memory access or on a retrieval and mental count of individual instances. A second experiment evaluated subject's capability to report category frequency at two levels of conceptual organization and whether the accuracy of either type of judgement was related to learning style. Data from both experiments suggested that frequency is encoded directly with the memory representation for the concept. The second experiment revealed a sensitivity for frequency of both higher and lower categories, although the former were substantially underestimated. Learning style was not related to either frequency judgement task. The observed underestimation of high frequencies implies a need to take this fundamental judgement bias into account when training persons to make frequency judgements as part of analytical tasks such as risk assessment. GRA

**N86-14895#** National Aerospace Lab., Amsterdam (Netherlands). Flight Div.

**THEORETICAL AND EXPERIMENTAL ANALYSIS OF PILOT FAILURE DETECTION BEHAVIOR DURING VARIOUS AUTOMATIC APPROACH CONDITIONS**

R. C. VANDEGRAAFF and P. H. WEWERINK 29 Apr. 1983 15 p refs Presented at 19th Ann. Conf. on Manual Control, Cambridge, Mass., 23-25 May 1983

(Contract NIVR-1857)

(NLR-MP-83025-U; B8566436; AD-B094280L) Avail: NTIS HC A02/MF A01

Pilots' failure detection performance was investigated in a moving-base flight simulator. The task considered was the monitoring of stabilized automatic approaches. Abnormal conditions (excessive wind shears or system failures) were to be detected on the basis of unacceptable deviations of displayed variables from their normal positions. Four experienced airline pilots participated in the experiment. The independent variables were: failure type (wind shear or system failure), the axis in which the failure occurred (longitudinal or lateral), and the prior probability of failure occurrence (0.2 to 0.8). The dependent variables were detection times and display deviations at the moment of detection. A theoretical analysis based on a model of the human observer and decision maker formulated in terms of linear estimation and classical sequential decision theory was carried out. Model and measurements agree well, although for two subjects failure detection times are larger. Results show that wind shears are detected more slowly than system failures. Author (ESA)

**N86-15868#** Joint Publications Research Service, Arlington, Va. **INVESTIGATION OF FACTORS DETERMINING PILOT'S GEOCENTRIC ORIENTATION**

V. V. LAPA, Y. Y. BUKALOV, and N. A. LEMESHCHENKO In its USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 24-30 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 19-23

Avail: NTIS HC A08

The use of a rational (geocentric) method of orientation in flight is determined by the specific content of the conceptual model that develops in the course of flying experience and by the display of the spatial position of perceptive signs of the geocentric system

of coordinates. The importance of these factors is confirmed by a shorter time and a lower number of errors made in assessing the spatial position when the display presented signs of the geocentric system of coordinates. These concepts are studied through flight simulation and flight tests. Author

**N86-15869#** Joint Publications Research Service, Arlington, Va. **EFFECT OF THREAT STRESS ON PSYCHOMOTOR STABILITY OF PILOTS DIFFERING IN ANXIETY LEVEL**

J. TERELAK and J. MACIEJCZYK In its USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 31-34 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 24-26

Avail: NTIS HC A08

The apparent anxiety as a personality factor cannot serve as a differentiating factor in the performance of psychomotor tasks (oculomotor coordination). It is shown that when pilots manifest a higher level of anxiety, performing specific tasks, their physiological expenditures increase. Author

**N86-15870#** Joint Publications Research Service, Arlington, Va. **USE OF FLIGHT SIMULATORS FOR DEMONSTRATION OF FUNCTIONAL CAPACITIES OF FLIGHT PERSONNEL**

V. A. BODROV, A. A. KUPRIYANOV, and V. V. KHARIN In its USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 35-39 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 26-29

Avail: NTIS HC A08

Psychophysiological parameters of 89 pilots were examined when they performed flight tasks under normal and complicated conditions. The experiments helped to reveal a group of test subjects (11.2%) who had low capabilities and made serious errors. The results obtained suggest that psychophysiological examinations during stimulated professional activity can be recommended as a method to be used for measuring adaptive and compensatory capabilities of pilots undergoing medical expertise. Author

**N86-15885#** Joint Publications Research Service, Arlington, Va. **ONE ASPECT OF CREW TRAINING**

Y. D. KONOVALOV In its USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 114-119 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 77-80

Avail: NTIS HC A08

This paper describes the psychophysical training of crewmembers of flying vehicles who may find it necessary to cross a water boundary or to remain for long in water after emergency splash-down. In order to prevent attacks of fear and panic caused by such frightful things as whirlpools and convulsions, the paper presents data on the nature of turbulent processes in running water and the techniques of overcoming them as well as on the origin of convulsions in swimmers and methods of their alleviation. B.W.

**N86-15911#** Toronto Univ. (Ontario).

**A COMPUTER MODEL OF DRIVER RESPONSE**

L. D. REID, W. O. GRAF, and I. A. STODDARD Sep. 1985 153 p refs Sponsored in part by General Motors and Ontario Ministry of Transportation and Communications (UTIAS-293; ISSN-0082-5255) Avail: NTIS HC A08/MF A01

The development of a digital computer software package designed to allow the user to predict the dynamic computer software package designed to allow the user to predict the dynamic response of a driver/vehicle system to a limited number of roadway scenarios is described. The simulation is restricted to a single vehicle travelling at constant forward speed and does not cover complex multivehicle interactions. When a driving scenario is specified, the program selects a driver model. A simulation program is used to steer the vehicle through the maneuvers necessary to



complete the driving task. In this manner records of steering wheel position and vehicle trajectory are generated. Three driving scenarios are included in the present development: (1) lane tracking along a straight roadway in the presence of disturbances; (2) lane tracking along a winding roadway; and (3) the obstacle avoidance maneuver. They are basically linear differential equations which mimic the driver's steering wheel response under the conditions which hold in each driving scenario. Each module in the analysis package is described. Author

**N86-15912#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

**A COMPUTER MODEL OF CASE-BASED REASONING IN PROBLEM SOLVING: AN INVESTIGATION IN THE DOMAIN OF DISPUTE MEDIATION** Ph.D. Thesis  
R. L. SIMPSON, JR. Jun. 1985 393 p  
(AD-A158097; AFIT/CI/NR-85-81D) Avail: NTIS HC A17/MF A01 CSCL 05J

Rather than approach each problem as a unique event, people often try to solve problems by recalling similar previous experiences as guides to problem solving. This analogical process, which we call case-based reasoning, seems to provide an explanation for the change in problem solving behavior of people over time. This research presents a computer process model of problem solving based on the use of case-based reasoning. The necessary reasoning processes, operational measures of similarity, and memory structures needed for effective storage and retrieval are presented via the specifications for an advisory system called the MEDIATOR, which offers advice on resolving common sense disputes. In this context, issues associated with enabling machines to dynamically adapt their reasoning and automatically recover from failure are discussed. The model of case-based problem solving which has been developed seems to offer promise as an integrated solution for some issues in problem solving, analogical reasoning, and machine learning. GRA

**N86-15913#** Georgia Inst. of Tech., Atlanta. Center for Man-Machine Systems Research.

**ON LOOKING INTO THE BLACK BOX: PROSPECTS AND LIMITS IN THE SEARCH FOR MENTAL MODELS** Technical Report, 1 Jun. 1982 - 31 May 1986

W. B. ROUSE and N. M. MORRIS May 1985 81 p  
(Contract N00014-82-K-0487)  
(AD-A159080; GIT-TR-85-2) Avail: NTIS HC A05/MF A01 CSCL 05J

The notion that humans have mental models of the systems with which they interact is a ubiquitous construct in many domains of study. This paper reviews the ways in which different domains define mental models, characterize the purposes of such models, and attempt to identify the forms, structures, and parameters of models. The resulting distinctions among domains are described in terms of two dimensions: (1) nature of model manipulation, and (2) level of behavioral discretion. A variety of salient issues emerge, including accessibility of mental models, forms and content of representation, nature of expertise, cue utilization, and, of most importance, instructional issues. Prospects for dealing with these issues are considered, as well as fundamental limits to identifying or capturing humans true mental models. GRA

**N86-15914#** Tennessee Univ., Knoxville.

**A GENERAL MODEL FOR THE HOMOGENEOUS CASE OF THE CONTINUOUS RESPONSE** Research Report

F. SAMEJIMA 31 Dec. 1983 125 p  
(Contract N00014-81-C-0569; DA PROJ. RR0-4204)  
(AD-A159345; AD-F630701; RR-83-3-ONR) Avail: NTIS HC A06/MF A01 CSCL 12A

A general model for the homogeneous case of the continuous response is proposed. The model is an expansion and generalization of the one proposed by the author in 1974, in which the open response situation is dealt with. In this generalized model, we deal with the closed response situation, and it includes the model for the open response situation as a special case. It also includes models for the open/closed and the closed/open

response situations as two special cases. The distinction among the four response situations depends upon the probability assigned to each of the two extreme values of the continuous response, i.e., the probability zero corresponds to the word open, and non-zero to closed. Some examples are given. GRA

**N86-15915#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abteilung Flugphysiologie und Psychologie.

**EXPERIENCE AND PERFORMANCE IN VIDEO GAMES AND ITS INFLUENCE ON APTITUDE TESTS IN AVIATION PSYCHOLOGY**

K. M. GOETERS and B. LORENZ Jul. 1985 47 p refs In GERMAN; ENGLISH summary  
(DFVLR-FB-85-43; ISSN-0171-1342) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 16.50

A method of evaluation of computer video games was used to analyze the relevance of video games for operational aptitude training in aviation psychology and their effects. A video game was used to test visual reaction under increased concentration strain, resistance to mental distraction, spatial orientation, and psychomotor coordination of air traffic controller applicants. Preexperience and performance with the game; preexperience and personality structure and interest; and the relationship between preexperience and performance tests were studied. Preexperience can influence performance with the game and the capacity structure. Preexperience with video games gives advantages to applicants in aviation psychology aptitude tests. Video games constitute a major psychomotor component in evaluation.

Author (ESA)

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### MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

**A86-17320**

**HUMAN ROLES IN FUTURE SPACE SYSTEMS**

H. L. WOLBERS (McDonnell Douglas Astronautics Co., Huntington Beach, CA) IN: Permanent presence - Making it work; Proceedings of the Twenty-second Goddard Memorial Symposium, Greenbelt, MD, March 15, 16, 1984. San Diego, CA, Univelt, Inc., 1985, p. 57-69. refs  
(AAS PAPER 84-117)

U.S. and Soviet space programs to date have graphically demonstrated the value of humans working in space. The point at issue is to determine where, along the continuum from direct manual intervention to completely automated operations, the mission requirements of future space programs can best be met. The criteria of performance, cost, and risk (mission success probability) are suggested as the principal factors by which program or project managers and systems engineers should select the most effective approach to meeting specific mission objectives. Examples of the application of these criteria are presented.

Author

**A86-17602#**

**ENVIRONMENTAL MANAGEMENT OF PAYLOAD PROCESSING FACILITIES**

F. B. WENKSTERN (McDonnell Douglas Astronautics Co., Cocoa Beach, FL) AIAA, Shuttle Environment and Operations Conference, 2nd, Houston, TX, Nov. 13-15, 1985. 7 p. refs  
(AIAA PAPER 85-6067)

Space Transportation System (STS) Orbiters and Payloads require environmentally controlled facilities for prelaunch testing and integration activities. John F. Kennedy Space Center (KSC) Cargo processing facilities are controlled by a KSC Cargo Facility

Contamination Control Plan. This plan addresses the four mandatory elements for environmentally controlled facilities: environmental monitoring, visual inspection, work rules, and operational controls. The KSC environmental program implements the plan and seeks to define and quantify the various levels of the four elements necessary to achieve required levels of cleanliness. Details of the program are presented to provide an understanding of contamination control at KSC in terms of processing facility capability. Author

**A86-17771\*** Search Technology, Inc., Norcross, Ga.

**THE EFFECTS OF TYPE OF KNOWLEDGE UPON HUMAN PROBLEM SOLVING IN A PROCESS CONTROL TASK**

N. M. MORRIS (Search Technology, Inc., Norcross, GA) and W. B. ROUSE (Georgia Institute of Technology, Atlanta) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-15, Nov.-Dec. 1985, p. 698-707. refs (Contract NAG2-123)

The question of what the operator of a dynamic system needs to know was investigated in an experiment using PLANT, a simulation of a generic dynamic production process. Knowledge of PLANT was manipulated via different types of instruction, so that four different groups were created: (1) minimal instructions only; (2) minimal instructions and guidelines for operation (procedures); (3) minimal instructions and dynamic relationships (principles); and (4) minimal instructions, and procedures, and principles. Subjects controlled PLANT in a variety of situations which required maintaining production while also diagnosing familiar and unfamiliar failures. Despite the fact that these manipulations resulted in differences in subjects' Knowledge, as assessed via a written test at the end of the experiment, instructions had no effect upon achievement of the primary goal of production, or upon subjects' ability to diagnose unfamiliar failures. However, those groups receiving procedures controlled the system in a more stable manner. Possible reasons for the failure to find an effect of principles are presented, and the implications of these results for operator training and aiding are discussed. Author

**A86-18541\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**PILOTS OF THE FUTURE - HUMAN OR COMPUTER?**

A. B. CHAMBERS and D. C. NAGEL (NASA, Ames Research Center, Moffett Field, CA) Computer (ISSN 0018-9162), vol. 18, Nov. 1985, p. 74-87. refs

In connection with the occurrence of aircraft accidents and the evolution of the air-travel system, questions arise regarding the computer's potential for making fundamental contributions to improving the safety and reliability of air travel. An important result of an analysis of the causes of aircraft accidents is the conclusion that humans - 'pilots and other personnel' - are implicated in well over half of the accidents which occur. Over 70 percent of the incident reports contain evidence of human error. In addition, almost 75 percent show evidence of an 'information-transfer' problem. Thus, the question arises whether improvements in air safety could be achieved by removing humans from control situations. In an attempt to answer this question, it is important to take into account also certain advantages which humans have in comparison to computers. Attention is given to human error and the effects of technology, the motivation to automate, aircraft automation at the crossroads, the evolution of cockpit automation, and pilot factors. G.R.

**A86-18730**

**SYSTEMS OF EFFICIENT MAN-COMPUTER INTERACTION [SISTEMY EFFEKTIVNOGO VZAIMODEISTVIA CHELOVEKA I EVM]**

F. I. RYBAKOV Moscow, Izdatel'stvo Radio i Sviaz', 1985, 200 p. In Russian. refs

Methods and facilities of man-computer interaction are analyzed and classified on the basis of a systems approach. Characteristics and efficiency criteria of interaction systems are examined, and questions of organization and implementation are discussed. The design of efficient functional and support facilities for users in

man-computer systems is considered. Particular attention is given to the use of a natural language for communication. B.J.

**A86-18731**

**MUSCLE VIBRATIONS AND MAN-MACHINE SYSTEM DYNAMICS [KOLEBANIIA MYSHTSY I DINAMIKA SISTEMY 'CHELOVEK-MASHINA']**

M. V. KHVINGIIA, T. G. TATISHVILI, A. M. BAGDOEVA, and G. G. TSULAIA Tbilisi, Izdatel'stvo Metsniereba, 1984, 88 p. In Russian. refs

The work considers the development of a man-machine system model and the analysis of a nonlinear muscle model under various types of external loads. A skeletal-muscle model is developed which includes (along with the usual motor fibers) modified fibers exceptionally sensitive to tension. In addition, a three-dimensional multimass model of four-arm and two-arm systems is developed which describes the vibrations of the upper extremities. Results are also presented on the stability and vibrations of an athlete's body during the simulation of various types of athletic activity. B.J.

**N86-14896#** Argonne National Lab., Ill. Computing Services.

**THE SCIENTIFIC WORKSTATION EVALUATION PROJECT: MULTIDISCIPLINARY EXPERIENCE WITH A SCIENTIFIC WORKSTATION**

R. C. RAFFENETTI, G. BIRGERSSON, R. N. BLOMQUIST, J. M. KENNEDY, D. D. KOELLING, A. J. POLICASTRO, and C. M. CARUTHERS, ed. 10 Dec. 1985 97 p refs (Contract W-31-109-ENG-38)

(ANL-84-100) Avail: NTIS HC A05/MF A01

The objective of this project has been to evaluate a scientific workstation. A workstation is a dedicated computing system that supplies a fixed quantity of computing resource for its user. A workstation's interactive response and its total throughput are limited by the speeds of various components of the workstation hardware and the operating system software. A forerunner of the scientific workstation is the so-called personal desktop computer, itself a kind of workstation. The architecture of the processors used in personal desktop computers cannot meet the needs of heavy-duty scientific computing work. Semiconductor companies are now striving to implement a generation of 32-bit microprocessors and related circuitry. Out of these efforts have appeared the complete computer systems which are capable of scientific computing. Members of the technical staff were invited to help define minimum configuration and minimum workstation capabilities. After the machine was selected and delivered, it was integrated into the Argonne computing environment. Following this integration, for five months of the six month evaluation period, user evaluators had an opportunity to use the workstation to do their scientific computing. Observations and conclusions are discussed in detail. B.W.

**N86-14897#** Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.

**HUMAN FACTORS ENGINEERING DESIGN CRITERIA FOR FUTURE SYSTEMS. DESIGN CRITERIA EVOLVING FROM THE FIRE SUPPORT TEAM VEHICLE (FIST-V) OPERATIONAL TEST 2 Research Report, for Period Ending Jan. 1984**

L. M. CRUMLEY and W. K. EARL Jan. 1985 26 p

(Contract DA PROJ. 2Q2-63739-A-793)

(AD-A158312; ARI-RP-85-04; R-2) Avail: NTIS HC A03/MF A01 CSCL 19C

Human factors engineering (HFE) design problems reported in the FIST-5 Operational Test 2 were compared with criteria in MIL-STD-1472C and MIL-HDBK-759A to determine criteria adequacy. Where problems occurred and the related current criteria were adequate, it is recommended that greater emphasis be given these criteria in future programs. New criteria are proposed for inadequate or missing criteria. HFE problems were distributed across 27 different equipment components. Current criteria were judged adequate for 25 features and inadequate for 2. Thus, adequate guidance was available in the current FIST-V partly due



to design constraints inherent in the vehicles since the FIST-V is a modification of the M901 Improved TOW Vehicle. GRA

**N86-14898#** Coast Guard, Washington, D.C. Office of Research and Development.

**A COMPARISON OF THE PROTECTION AGAINST IMMERSION HYPOTHERMIA PROVIDED BY COAST GUARD ANTI-EXPOSURE CLOTHING IN CALM VERSUS ROUGH SEAS Final Report**

A. M. STEINMAN, M. J. NEMIROFF, J. S. HAYWARD, and P. S. KUBILIS Jun. 1985 86 p  
(AD-A158413; USCG-D-17-85) Avail: NTIS HC A05/MF A01 CSCL 06Q

The purpose of this study was to compare the protection against immersion hypothermia provided by various types of Coast Guard Operational clothing to survivors of mishaps in calm versus rough seas. Eight garment ensembles were evaluated: (1) flight suit (control); (2) full wet suit and (3) shorty wet suit (tight-fitting wet garments); (4) aviation antiexposure coveralls; (5) boatcrew antiexposure coveralls, and (6) thermal float coat (loose-fitting wet garments); (7) dry suit; (8) survival suit (dry garments). Mean calm-water temperature was 10.7 C. Rough water mean temperature was 11.1 C. with 4 to 6 foot swells, occasional 4-foot breaks, 2 to 3 foot wind-waves and 0 to 3 knots current. Eight volunteer Coast Guard crewmen wore each garment-ensemble once in each of the two sea conditions. Dependent variables were rectal temperature, groin skin temperature, back skin temperature, heart rate, and subjective evaluations of warmth, tightness of garment fit, and amount of cold water flushing. The results showed significantly faster mean rectal temperature cooling rates and significantly larger declines in skin temperatures in rough seas than in calm seas for subjects wearing the float coat, aviation anti-exposure coveralls and boatcrew coveralls. Heart rates were significantly faster in rough seas than in calm seas for all garments. Rectal and skin temperature changes were positively correlated with each other and with subjective evaluation of cold water flushing, but they were negatively correlated with warmth and tightness of fit. In general, dry garments provided better protection than did wet garments in both sea conditions, and tight-fitting wet garments provided better protection than did loose-fitting wet garments in rough seas. GRA

**N86-14899#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**TEAM PERFORMANCE WITH LARGE AND SMALL SCREEN DISPLAYS**

C. E. BROWN and D. G. LEUPP Jun. 1985 20 p  
(AD-A158761; AAMRL-TR-85-033) Avail: NTIS HC A02/MF A01 CSCL 05H

Large displays are common in modern command centers, yet the rationale for their use is typically weak. A literature search revealed little previous work comparing performance of teams with large group displays versus individual CRT's. The most applicable previous studies used static tasks and photographic projection systems. The study described here used a complex, dynamic task which required extensive interaction between members of three-person teams to achieve best performance. A comparison was made between the performance of three-person teams viewing either one large screen display or three individual CRT's. Results indicate that display size did not strongly affect team performance, although there were differences in the details of task performance that are attributable to display variables. GRA

**N86-14900#** Clarke Ambrose, Inc., Knoxville, Tenn.

**HUMAN-MACHINE INTERFACE IN MOBILE TELEOPERATORS**

J. V. DRAPER 1985 15 p Presented at the Workshop on Requirements of Mobile Teleoperators for Radiological Emergency Response and Recovery, Dallas, 23 Jun. 1985  
(Contract DE-AC05-84OR-21400)  
(DE85-013639; CONF-8506148-1) Avail: NTIS HC A02/MF A01

Several reasons are given for the importance of human operators. An ideal human teleoperator interface called telepresence is defined. It is concluded that the human machine

interface is not ideal, and that it may be improved, and that available and developing technology can improve interfaces. E.R.

**N86-14901#** Little (Arthur D.), Inc., Cambridge, Mass.

**ABRASION-RESISTANT ALUMINIZED-COATED ARAMID FABRICS FOR MANUFACTURE OF FIREFIGHTERS' PROTECTIVE CLOTHING Final Technical Report**

R. BRENNEMAN 10 Oct. 1985 71 p  
(Contract N00140-83-C-RA12)  
(AD-A157056; ADL-88860; NCTRF-160) Avail: NTIS HC A04/MF A01 CSCL 11E

The required yardage of two experimental approaches to developing an abrasion resistant fabric for firefighters protective clothing has been delivered to NCTRF, Natick, Ma, for fabrication into uniforms. The first is an electron-beam (EB) cured coating on the two-side aluminized mylar used in the existing laminated fabric. The second is a one-side aluminized Kapton (K) film laminated metal side to Kevlar fabric. The Kapton product illustrates the principle that a high temperature melting point film, aluminized on one side and laminated metal side down to Kevlar fabric, can provide abrasion and chemical resistance as well as reflectivity. However, its water absorption and adhesive characteristics severely limit use in the water-prone firefighters environment. We believe other high-temperature melting resins, such as polysulfone or polyether-imide, would probably have more suitable adhesive properties than Kapton because they are more water resistant. Both the experimental EB and Kapton products absorb more heat than the existing product because they reflect less infrared energy than the pure aluminum on the existing product. It is a fundamental fact that only gold metal can be coated on aluminum without reducing its reflectivity of the aluminum. GRA

**N86-14946#** Rutgers - The State Univ., New Brunswick, N. J. Dept. of Mechanical Industrial and Aerospace Engineering.

**APPLICATION OF SCREW CALCULUS TO THE EVALUATION OF MANIPULATOR WORKSPACE**

L. M. HSIA and T. W. LEE /in ARO Transactions of the 2nd Army Conference on Applied Mathematics and Computing p 765-785 Feb. 1985  
(AD-P004947) Avail: NTIS HC A99/MF E03 CSCL 12A

In this paper, an analytical technique is presented that is based on screw calculus and dual-number matrices to derive the kinematic equations and the workspace formulations of robotic manipulators. A computational procedure for quantitative evaluation of workspace volume is also developed. Several examples are chosen to demonstrate the usefulness and the effectiveness of the approach. One of the basic problems encountered in manipulator design is the determination of the shape of workspace and its characteristics. The workspace, which is the one of operation of a manipulator, is the space associated with possible positions and orientations of the last link of a manipulator. A knowledge of the workspace of a manipulator can provide a measure of the efficiency of the design. Therefore, the investigation on workspace is a fundamental interest. GRA

**N86-15444#** Joint Publications Research Service, Arlington, Va. CNES OF FRANCE RESEARCHES REMOTE CONTROL SYSTEM FOR SPACE

J. M. GUILBERT /in its West Europe Report: Science and Technology (JPRS-WST-85-015) p 1-4 14 May 1985 Transl. into ENGLISH from Revue Generale de L'Electricite (Paris), Nov. 1984 p 724; 728-729  
Avail: NTIS HC A04/MF A01

Mission analysis studies show that the needs for remote control fall into two broad categories: (1) needs for intervention, repair and maintenance; and (2) needs for deployment, assembly and construction. Depending on the missions and on whether the operator is on board the remote-controlling craft or on Earth, the remote-control system will have more or less autonomy of decision. The field of remote-control in space is discussed, as are a few projected or completed systems illustrating the interest of remote control, with or without a man on board. Author

**N86-15867#** Joint Publications Research Service, Arlington, Va.  
**SOME ASPECTS OF DETERMINING HUMAN PHYSICAL WORK CAPACITY UNDER HYPERBARIC CONDITIONS**

L. A. BRYANTSEVA and A. Y. MIKHENKO *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 11-23 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 11-19  
 Avail: NTIS HC A08

Physical work capacity of man during real and simulated dives is discussed in view of the reported data. The parameter is known to decrease as the breathing gas density and immersion depth increase. The factors limiting the work capacity growth are as follows: greater respiration resistance, higher energy cost of ventilation, CO<sub>2</sub> retention, dyspnea, adverse circulation changes. During exposure hyperbaric bradycardia occurs both at rest and upon a work load. This precludes prediction of physical work capacity on the basis of the heart rate alone as a parameter used in a normobaric environment. Tabulated data on the work capacity of divers at various depths obtained by different authors is presented. Author

**N86-15886#** Joint Publications Research Service, Arlington, Va.  
**METHOD OF CALCULATING ANGULAR DIMENSIONS OF FLIGHT VEHICLE COCKPIT CANOPY CASINGS**

A. V. LEKAREV *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) p 120-124 4 Nov. 1985 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 81-83  
 Avail: NTIS HC A08

The view from flight vehicle (FV) cockpits is an important factor in assuring flying safety and providing comfortable conditions for the pilot's visual observation of space outside the cockpit. At the present time, transparent parts of most cockpits in different types of FV are executed in the form of flat panels installed into the metal frame of the cockpit canopy. Presence of opaque components (casings) in the cockpit canopy results in obscuring part of the outside area, which worsens viewing conditions from the pilot's work place. In order to improve the view from FV cockpits with flat transparent parts, a method was developed for calculating the angular dimensions of casings (seams) on the basis of distinctions of human binocular vision. The proposed method makes it possible to meet the requirements as to strength features of the canopy frame and provide for comfortable viewing conditions outside the cockpit. The method is based on crossed diplopia in an empirical horopter from a point of the cyclopic eye of the observer. B.W.

**N86-15916#** Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.

**HUMAN FACTORS ENGINEERING DESIGN CRITERIA FOR FUTURE SYSTEMS. REPORT NUMBER 3: DESIGN CRITERIA EVOLVING FROM THE MULTIPLE MULTIPLE ROCKET SYSTEM (MLRS) OPERATIONAL TEST 3 Research Report, for Period Ending Apr. 1984**

W. K. EARL and L. M. CRUMLEY Jan. 1985 36 p  
 (AD-A158316; ARI-RP-85-05) Avail: NTIS HC A03/MF A01  
 CSCL 19G

This document compares human factors engineering related problems identified in the U.S. Army Operational Test and Evaluation Agency MLRS Operational Test 3 with relevant criteria statements from MIL-HDBK-759A and MIL-STD-1472C. These criteria were reviewed to determine if they provided adequate guidance for making informed design judgements. Areas where existing criteria are inadequate or nonexistent were identified and new complete criteria developed. The new criteria are presented in a format designed to facilitate their use in the design of future similar systems. GRA

**N86-15917#** Naval Postgraduate School, Monterey, Calif.  
**MANAGING COMPUTER SYSTEMS DEVELOPMENT: UNDERSTANDING THE HUMAN AND TECHNOLOGICAL IMPERATIVES M.S. Thesis**

G. S. CURTIS Jun. 1985 154 p  
 (AD-A158976) Avail: NTIS HC A08/MF A01 CSCL 05H

This thesis examines the human and technological issues that are often encountered during the development of modern computer information systems. People and technical constraints, including suggestions for minimizing negative consequences, are illustrated throughout the development life cycle. Special emphasis is placed on strategic planning, end user involvement in the requirements definition phase, and user-oriented software. The research consists of a review of current literature concerning techniques, methods and methodologies that are the basis for managing computer information system development. It is a collection of bits and pieces of wisdom by experts from all disciplines within the computer and managing fields. These techniques can be tailored to various scale projects having myriad objectives. The theory and practice of management methods included in this paper can be applied universally to computer projects. However, the study is directed at all U.S. Navy managers who are, or will be, involved in the transition to modern computer information systems. GRA

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### PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

**A86-16417**

**BOUNDARY STRUCTURES ARE FORMED BY ORGANIC COMPONENTS OF THE MURCHISON CARBONACEOUS CHONDRITE**

D. W. DEAMER (California, University, Davis) Nature (ISSN 0028-0836), vol. 317, Oct. 31, 1985, p. 792-794. refs

Boundary structures forming in aqueous phases from nonpolar organic components of carbonaceous chondrites are reported for the first time. The recovery of the nonpolar organic material which formed these structures from the Murchison meteorite is described, and the properties of the material are reported. Two kinds of boundary structures were formed at alkaline pH ranges: microstructures in the form of viscous fluid droplets and thin boundaries capable of acting as a barrier to free diffusion. C.D.

**A86-16425**

**SPIN-DEPENDENT ELECTRON SCATTERING FROM OPTICALLY ACTIVE MOLECULES**

D. M. CAMPBELL and P. S. FARAGO (Edinburgh, University, Scotland) Nature (ISSN 0028-0836), vol. 318, Nov. 7, 1985, p. 52, 53. refs

It has been suggested that spin-polarized electrons or positrons emerging in the beta decay of radioactive nuclei may have led to a preferential destruction of one of the two isomers at an early stage of evolution. This process tipped the initial balance of abundance of the two self-replicating isomers, leading to the present isomeric purity of biomolecules. Here, an experiment is described which indicates that spin-polarized electrons, when scattered from optically active molecules, can 'distinguish' between right-handed and left-handed isomers. C.D.

**A86-17623**

**MOLECULAR THEORY OF EVOLUTION: OUTLINE OF A PHYSICO-CHEMICAL THEORY OF THE ORIGIN OF LIFE**

B.-O. KUEPPERS (Max-Planck-Institut fuer biophysikalische Chemie, Goettingen, West Germany) Berlin and New York, Springer-Verlag, 1983, 330 p. Translation. refs

The molecular basis of biological information, principles of molecular selection and evolution, the transition from nonliving to living systems, and theoretical models of evolution and the ways

in which they might be tested are considered. Statistical treatment of deterministic and stochastic theories of selection is presented. The information threshold for nucleic acids, information integrating mechanisms, the origin of the genetic code, and self-organization in macromolecular networks are given special consideration. The points of contact between the molecular theory of evolution and the thermodynamic theory of irreversible processes are examined in the framework of thermodynamic principles. Mathematical presentations of the eigenvalue problem, linear stability analysis, and the method of Lagrange multipliers as well as the mathematical relationships involved in stochastic processes are included. I.S.

examined. The data obtained support an amino acid synthesis process involving random combination of single-carbon precursors. I.F.

#### A86-17740

##### **RADIATION CHEMISTRY OF A MULTICOMPONENT AQUEOUS SYSTEM RELEVANT TO CHEMISTRY OF COMETARY NUCLEI**

Z. D. DRAGANIC, S. I. VUJOSEVIC, A. NEGRON-MENDOZA, J. A. AZAMAR, and I. G. DRAGANIC (Universidad Nacional Autonoma de Mexico, Villa Obregon, Mexico) *Journal of Molecular Evolution* (ISSN 0022-2844), vol. 22, no. 2, 1985, p. 175-187. refs

Consequences of irradiation of a water-dominated multicomponent system with large doses (16 to 300 Mrad) of gamma rays from a Co-60 source at 77 and 3210 K were examined. The chemical composition of the 0.2 M HCN/0.12 M CH<sub>3</sub>OH/0.04 M CH<sub>3</sub>CN/0.02 M C<sub>2</sub>H<sub>5</sub>CN/0.01 M HCOOH system in oxygen-free water was based on the assumptions that comets originated in the outer regions of a primordial nebula and that interstellar compounds are the chemical constituents of the nucleus. Column, paper, and gas chromatography, together with other conventional methods, were used in the analysis of radiolysis products. At 310 K, about 40 radiolytic products were identified, including some aldehydes, amino acids, and carboxylic acids. Polymeric material with M(w) values of up to 80,000 daltons was separated. At 77 K, the basic radiolysis products were presented, but in lesser quantities (by one to two orders of magnitude). The relevance of the findings to the chemistry of a liquid-water core and the ice layers of a cometary nucleus is discussed, including chemical composition of the nucleus and its temperature regime. I.S.

#### A86-17807

##### **PARITY-VIOLATING ENERGY DIFFERENCES OF CHIRAL MINERALS AND THE ORIGIN OF BIOMOLECULAR HOMOCHIRALITY**

G. E. TRANTER (Oxford University, England) *Nature* (ISSN 0028-0836), vol. 318, Nov. 14, 1985, p. 172, 173. refs

The homochirality in the biochemistry of terrestrial organisms may be a result of very small differences between the electronic energies of enantiomeric prebiotic molecules resulting from the parity-violating weak interactions. The energy differences are, however, so small for simple chiral molecules that the propagation of homochirality would require a dissymmetry amplification mechanism involving both large quantities of reactants and long reaction time. An alternative theory, presented here, suggests that the effects of the parity-violating weak interactions in crystalline enantioselective prebiotic catalysts, such as clay silicates, may require considerably less amplifications. C.D.

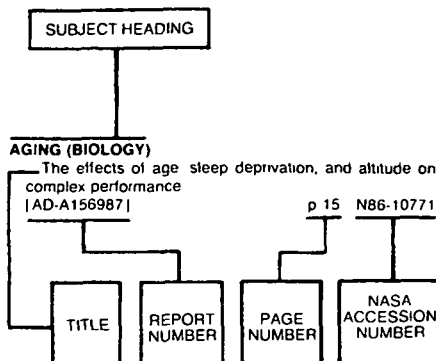
#### A86-19126\* Arizona State Univ., Tempe.

##### **AMINO ACIDS OF THE MURCHISON METEORITE. II - FIVE CARBON ACYCLIC PRIMARY BETA-, GAMMA-, AND DELTA-AMINO ALKANOIC ACIDS**

J. R. CRONIN, S. PIZZARELLO, and G. U. YUEN (Arizona State University, Tempe) *Geochimica et Cosmochimica Acta* (ISSN 0016-7037), vol. 49, Nov. 1985, p. 2259-2265. refs (Contract NSG-7255)

The five-carbon acyclic primary beta, gamma, and delta amino alkanolic acids of the Murchison meteorite are studied using gas chromatography-mass spectrometry and ion exchange chromatography. The chromatograms reveal that alpha is the most abundant monoamino alkanolic acid followed by gamma and beta, and an exponential increase in the amount of amino acid is observed as the carbon number increases in the homologous series. The influence of frictional heating, spontaneous thermal decomposition, and radiation of the synthesis of amino acids is

## Typical Subject Index Listing



The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, the title extension is added, separated from the title by three hyphens. The (NASA or AIAA) accession number and the page number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence with the AIAA accession numbers appearing first.

## A

### ABIOTENESIS

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### ACCELERATION STRESSES (PHYSIOLOGY)

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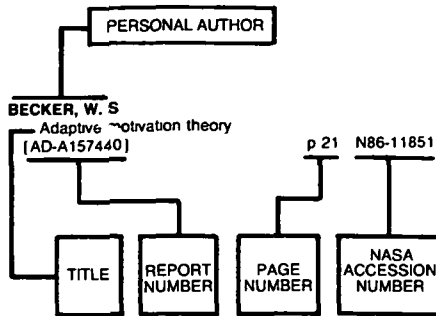
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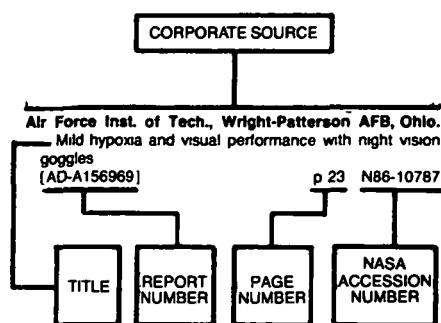
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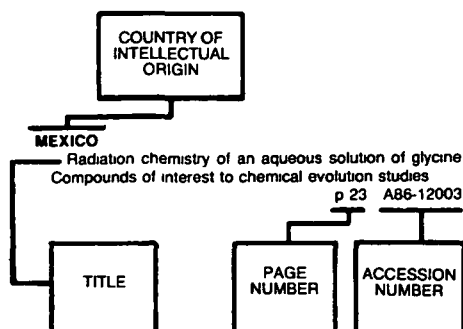
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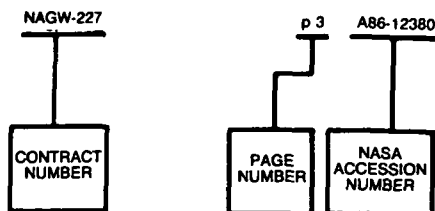
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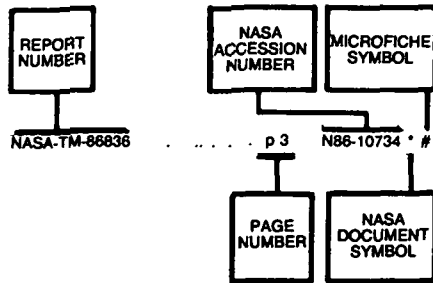
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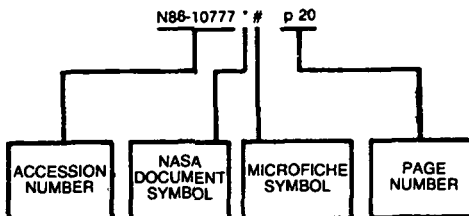
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**AUTHOR** → **M KAREL, A R KAMAREI, and Z NAKHOST** Mar 1985 37 p refs → **PUBLICATION DATE**

**REPORT NUMBER** → **(Contract NCC2-231) (NASA-CR-176257, NAS 1 26 176257)** Avail NTIS HC A03/MF A01 CSCL 06C → **COSATI CODE**

**AVAILABILITY SOURCE** → The major nutritional components of the green algae (*Scenedesmus obliquus*) grown in a Constant Cell density Apparatus were determined Suitable methodology to prepare proteins from which three major undesirable components of these cells (i.e., cell walls, nucleic acids, and pigments) were either removed or substantially reduced was developed Results showed that processing of green algae to protein isolate enhances its potential nutritional and organoleptic acceptability as a diet component in a Controlled Ecological Life Support System

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## TYPICAL CITATION AND ABSTRACT FROM /AA

**NASA SPONSORED DOCUMENT** → **A86-12001\*** National Biomedical Research Foundation, Washington, D. C

**AIAA ACCESSION NUMBER** → **NEW PERSPECTIVES ON BACTERIAL FERREDOXIN EVOLUTION** → **TITLE**

**AUTHORS** → **D G GEORGE, L T HUNT, L-S L YEH, and W C BARKER** → **AUTHOR'S AFFILIATION**

**TITLE OF PERIODICAL** → **(National Biomedical Research Foundation, Washington, DC) Journal of Molecular Evolution (ISSN 0022-2844), vol 22, no 1, 1985, p. 20-31. refs** → **PUBLICATION DATE**

**(Contract NASW-3954; NIH-GM-08710; NIH-RR-01821)**

Ferredoxins are low-molecular-weight, nonheme, iron proteins which function as electron carriers in a wide variety of electron transport chains. Howard et al (1983) have suggested that the amino end of *Azotobacter vinelandii* ferredoxin shows a greater similarity to the carboxyl end of ferredoxin from *Chromatium vinosum* and that their half-chain sequences are homologous when the half-chains of either species are considered in inverse order Examination of this proposition has made it necessary to reevaluate previous conclusions concerning the evolution of bacterial ferredoxin Attention is given to the properties of the bacterial ferredoxin sequences, and the evolution of the bacterial ferredoxins.

G.R



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